Hartsfield-Jackson Atlanta International Airport

HARTSFIELD-JACKSON AVIATION DESIGN COLLABORATIVE

WEST CROSSOVER CORRIDOR IMPROVEMENTS
APM BAG CLAIM ESCALATOR WALL MODIFICATIONS

SPECIFICATIONS
WBS # H.03.10.017

ISSUED FOR BID
JANUARY 27, 2015

SCOTT ASSOCIATES ARCHITECTS INC.
80 Bloor Street West Suite 1400
Toronto Ontario Canada M5S 2V1
Ph +416-975-5200
Fx +416-975-4990
Em sdlee@saai.ca

ROBERT L. BROWN & ASSOCIATES INC
250 Ponce de Leon Avenue, 8th Floor
Decatur, Georgia 30030-0126
PH + (404)-277-2460
Em: jledwards@rlbrown.cpm

DOCUMENT 0 - INTRODUCTORY INFORMATION
BIDDING REQUIREMENTS, CONTRACT REQUIREMENTS

DIVISION 1 - GENERAL REQUIREMENTS

DIVISION 5 - METALS

DIVISION 6 - WOOD AND PLASTICS

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

DIVISION 8 – DOORS AND WINDOWS

DIVISION 9 - FINISHES

DIVISION 26 – ELECTRICAL

DIVISION 27 – COMMUNICATIONS

DIVISION 28 – ELECTRONIC SAFETY and SECURITY

END OF SECTION 00 01 10

GENERAL

G1.1.06 COVER SHEET
G1.1.07 MATERIAL DELIVERY AND REMOVAL SITE PLAN
G1.1.08 MATERIAL DELIVERY/REMOVAL ROUTES

ARCHITECTURAL

A1.1.10 EXISTING PLANS – AGTS AND MEZZANINE LEVELS
A1.1.11 EXISTING & DEMOLITION PLANS – LEVEL 2 AND LEVEL 3
A1.3.10 PROPOSED PLANS – AGTS AND MEZZANINE LEVELS
A1.3.11 PROPOSED PLANS – LEVEL 2 AND LEVEL 3
A3.1.01 DEMOLITION ELEVATION – SOUTH WALL
A3.1.02 DEMOLITION ELEVATION – NORTH WALL
A3.3.01 PROPOSED ELEVATION – SOUTH WALL
A3.3.02 PROPOSED ELEVATION – NORTH WALL
A3.3.03 DEMOLITION AND PROPOSED ELEVATION – WEST WALL
A3.3.04 PROPOSED WEST WALL ELEVATION
A6.1.10 DEMOLITION AND PROPOSED CEILING PLAN – LEVEL 3
A8.1.20 DETAILS

STRUCTURAL

S1.1.01 SECTIONS AND DETAILS
S1.1.02 SECTIONS AND DETAILS

ELECTRICAL

E1.0.01 ELECTRICAL GENERAL
E1.1.01 ELECTRICAL DEMOLITION PLAN
E1.2.01 ELECTRICAL POWER PLAN
E1.3.01 ELECTRICAL LIGHTING PLAN

COMMUNICATIONS

Y0.1.01 SYMBOLS, NOTES AND ABBREVIATIONS
Y1.3.01 PROPOSED PARTIAL THIRD FLOOR PLAN
Y1.4.01 PARTIAL FOURTH FLOOR PLAN
Y2.0.01 VIDEO WALL BLOCK DIAGRAM
Y3.0.01 VIDEO WALL CONFIGURATION
Y4.0.01 DETAILS

END OF SECTION 00 01 15

1.01 DESCRIPTION

A. This item shall consist of preparatory work and operations, including, but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the project site; and for all other work and operations which must be performed or costs incurred prior to beginning work on the various items on the project site.

1.02 BASIS OF PAYMENT

A. Partial payments will be made as follows:

1. When Contractor's first monthly invoice is approved and processed, fifty percent (50%) of the amount bid for mobilization will be paid.

2. When ten percent (10%) of the original contract amount is earned, seventy-five percent (75%) of the remaining amount bid for mobilization will be paid.

3. When twenty-five percent (25%) of the original contract amount is earned, ninety percent (90%) of the remaining amount bid for mobilization will be paid.

4. When fifty percent (50%) of the original contract amount is earned, ninety five percent (95%) of the remaining amount bid for mobilization will be paid.

5. When ninety percent (90%) of the original contract amount is earned, one hundred percent (100%) of the remaining amount bid for mobilization will be paid.

6. The total sum of all payments shall not exceed the original contract amount bid for the item, regardless of the fact that the Contractor may have, for any reason, shut down his work on the project or moved equipment away from the project and then back again.

7. The amount Bid for Mobilization shall not exceed five percent (5%) of the total amount bid for the contract, in order to be paid on the above basis of payment. Any amount in excess of 5% will be paid on the final estimate.

B. Payment will be made under:

Item SP-1-1- Mobilization - Per Lump Sum.

END OF SECTION SP-1

1.01 DESCRIPTION

A. This section shall consist of miscellaneous work to be accomplished at the discretion and direction of the Engineer. It shall include items of work consistent with and related to the project which are not shown on the plans but which may be necessary for the successful completion of the contract. It is expected that work under this section will be accomplished utilizing construction items established under the other sections of these specifications.

1.02 GENERAL PROCEDURES

A. All work performed under this section shall comply with the various sections of these specifications which are appropriate to the specific items involved. This work shall be further described, by the Engineer, in written form and/or on modifications to the contract drawings or on supplemental drawings. In any event, no work will be allowed under this section without the prior approval of the Engineer.

1.03 MEASUREMENT AND PAYMENT

A. Payment for work accomplished under this section shall be in accordance with the various sections of these specifications corresponding to the specific items of work involved and the schedule of values accepted for the new items.

B. In the event that work is proposed by the City using parties other than the Contractor, the Contractor shall be allowed a maximum markup of five percent (5%) for administration and coordination costs over and beyond the proposed cost of the work.

1.04 BASIS OF PAYMENT

A. Payment will be made under:
Item SP-2-1 – Project Contingency – Per Allowance

END OF SECTION SP-2

1.01 DESCRIPTION

A. This section shall consist of removal and relocation of existing Olympic artwork located at the top of the escalator exiting the Transportation Mall AT Bag Claim and will be accomplished at the discretion and direction of the Owner per Article 5 – City's Payment Obligation, Section 5.8 - Project Contingency and Allowances. As such, the Contractor is not to plan to commit or commit any funds associated with this Allowance without prior written approval by the Owner. The work to be paid by this allowance is the removal and relocation of existing artwork located at the entrance to restrooms which is required to facilitate the West Crossover Improvements. It is expected that work under this section will be accomplished utilizing construction items established under the other sections of these specifications and Contract.

1.02 GENERAL PROCEDURES

A. All work performed under this section shall comply with the various other sections of these specifications and Contract which are appropriate for each specific item of work. Additionally, the work shall be further described by the Engineer in written form and /or on modifications to the contract drawings or on supplemental drawings. In any event, no work or expenses will be allowed under this section without the prior written approval of the Engineer.

1.03 MEASUREMENT AND PAYMENT

A. Measurement for work accomplish under this section shall be in accordance with the various other sections of the contract and specifications corresponding to the specific items of work involved. Method of payment shall be as agreed by the Engineer and the contractor.

B. In the event that work under this section requires the using of parties other than the Contractor, the Contractor shall be allowed a maximum markup of ten percent (10%) on the Subcontractor's invoice.

C. In the event that work under this section is self-perform by the Contractor, the Contractor shall be allowed a maximum mark-up of fifteen percent (15%) on the direct cost of the work.

1.04 BASIS OF PAYMENT

A. Payment will be made under:
Item SP-3-1 – Removal and Relocation of Olympic Artwork – Per Allowance

END OF SECTION SP-3

1.01 DESCRIPTION

A. This section shall consist of additional security required and/or maintenance of passenger flow exiting the escalators and moving thru the construction area and will be accomplished at the discretion and direction of the Owner per Article 5 – City's Payment Obligation, Section 5.8 - Project Contingency and Allowances. As such, the Contractor is not to plan to commit or commit any funds associated with this Allowance without prior written approval by the Owner. The work to be paid by this allowance is the removal and relocation of existing artwork located at the entrance to restrooms which is required to facilitate the West Crossover Improvements. It is expected that work under this section will be accomplished utilizing construction items established under the other sections of these specifications and Contract.

1.02 GENERAL PROCEDURES

A. All work performed under this section shall comply with the various other sections of these specifications and Contract which are appropriate for each specific item of work. Additionally, the work shall be further described by the Engineer in written form and /or on modifications to the contract drawings or on supplemental drawings. In any event, no work or expenses will be allowed under this section without the prior written approval of the Engineer.

1.03 MEASUREMENT AND PAYMENT

A. Measurement for work accomplish under this section shall be in accordance with the various other sections of the contract and specifications corresponding to the specific items of work involved. Method of payment shall be as agreed by the Engineer and the contractor.

B. In the event that work under this section requires the using of parties other than the Contractor, the Contractor shall be allowed a maximum markup of ten percent (10%) on the Subcontractor's invoice.

C. In the event that work under this section is self-perform by the Contractor, the Contractor shall be allowed a maximum mark-up of fifteen percent (15%) on the direct cost of the work.

1.04 BASIS OF PAYMENT

A. Payment will be made under:
Item SP-4-1 – Additional Security and Maintenance of Passenger Flow – Per Allowance

END OF SECTION SP-4

1.01 DESCRIPTION

A. This section shall consist of software support for the WCO video wall system and will be accomplished at the discretion and direction of the Owner per the contract documents. As such, the Contractor is not to plan to commit or commit any funds associated with this Allowance without prior written approval by the Owner. The work to be paid by this allowance is the removal and relocation of existing artwork located at the entrance to restrooms which is required to facilitate the West Crossover Improvements. It is expected that work under this section will be accomplished utilizing construction items established under the other sections of these specifications and Contract.

1.02 GENERAL PROCEDURES

A. All work performed under this section shall comply with the various other sections of these specifications and Contract which are appropriate for each specific item of work. Additionally, the work shall be further described by the Engineer in written form and /or on modifications to the contract drawings or on supplemental drawings. In any event, no work or expenses will be allowed under this section without the prior written approval of the Engineer.

1.03 MEASUREMENT AND PAYMENT

A. Measurement for work accomplish under this section shall be in accordance with the various other sections of the contract and specifications corresponding to the specific items of work involved. Method of payment shall be as agreed by the Engineer and the contractor.

B. In the event that work under this section requires the using of parties other than the Contractor, the Contractor shall be allowed a maximum markup of ten percent (10%) on the Subcontractor's invoice.

C. In the event that work under this section is self-perform by the Contractor, the Contractor shall be allowed a maximum mark-up of fifteen percent (15%) on the direct cost of the work.

1.04 BASIS OF PAYMENT

A. Payment will be made under:
Item SP-5-1 – Additional Security and Maintenance of Passenger Flow – Per Allowance

END OF SECTION SP-5

1.01 DESCRIPTION

A. This section shall consist of assistance by the Customer Care Team Subcontractor, as may be required, to manage the pedestrian traffic while barricades and/or scaffolds are in place and will be accomplished at the discretion and direction of the Owner per Article 5 – City's Payment Obligation, Section 5.8 - Project Contingency and Allowances. As such, the Contractor is not to plan to commit or commit any funds associated with this Allowance without prior written approval by the Owner. The work to be paid by this allowance is the removal and relocation of existing artwork located at the entrance to restrooms which is required to facilitate the West Crossover Improvements. It is expected that work under this section will be accomplished utilizing construction items established under the other sections of these specifications and Contract.

1.02 GENERAL PROCEDURES

A. All work performed under this section shall comply with the various other sections of these specifications and Contract which are appropriate for each specific item of work. Additionally, the work shall be further described by the Engineer in written form and /or on modifications to the contract drawings or on supplemental drawings. In any event, no work or expenses will be allowed under this section without the prior written approval of the Engineer.

1.03 MEASUREMENT AND PAYMENT

A. Measurement for work accomplish under this section shall be in accordance with the various other sections of the contract and specifications corresponding to the specific items of work involved. Method of payment shall be as agreed by the Engineer and the contractor.

B. In the event that work under this section requires the using of parties other than the Contractor, the Contractor shall be allowed a maximum markup of ten percent (10%) on the Subcontractor's invoice.

1.04 BASIS OF PAYMENT

A. Payment will be made under:
Item SP-6-1 – Customer Care Representative Team – Per Allowance

END OF SECTION SP-6

1.01 DESCRIPTION

A. This section shall consist of asbestos removal in the event asbestos is found to be present in any material that is deemed to be a hazard at the job site and will be accomplished at the discretion and direction of the Owner per Article 5 – City's Payment Obligation, Section 5.8 - Project Contingency and Allowances. As such, the Contractor is not to plan to commit or commit any funds associated with this Allowance without prior written approval by the Owner. The work to be paid by this allowance is the removal and relocation of existing artwork located at the entrance to restrooms which is required to facilitate the West Crossover Improvements. It is expected that work under this section will be accomplished utilizing construction items established under the other sections of these specifications and Contract.

1.02 GENERAL PROCEDURES

A. All work performed under this section shall comply with the various other sections of these specifications and Contract which are appropriate for each specific item of work. Additionally, the work shall be further described by the Engineer in written form and /or on modifications to the contract drawings or on supplemental drawings. In any event, no work or expenses will be allowed under this section without the prior written approval of the Engineer.

1.03 MEASUREMENT AND PAYMENT

A. Measurement for work accomplish under this section shall be in accordance with the various other sections of the contract and specifications corresponding to the specific items of work involved. Method of payment shall be as agreed by the Engineer and the contractor.

B. In the event that work under this section requires the using of parties other than the Contractor, the Contractor shall be allowed a maximum markup of ten percent (10%) on the Subcontractor's invoice.

C. In the event that work under this section is self-perform by the Contractor, the Contractor shall be allowed a maximum mark-up of fifteen percent (15%) on the direct cost of the work.

1.04 BASIS OF PAYMENT

A. Payment will be made under:
Item SP-7-1 – Asbestos Removal – Per Allowance

END OF SECTION SP-7

1.01 DESCRIPTION

A. This section shall provide a means for compensating the Contractor in the event that the Contractor is denied access to the work area due to Airport Operational requirements. These items of payment, within this section, shall be eligible for measurement and payment only under the following conditions.

1. The Contractor has given the Engineer sufficient evidence of ability to mobilize personnel, equipment, and materials in the area of the work and access had been denied due to Airport Operational requirements.

2. The effective time of the work period is reduced by the amount of the delay.

1.02 METHOD OF MEASUREMENT

A. Contractor standby time shall be measured by the minute for each minute the Contractor is delayed access to a scheduled work area meeting the conditions described above under Description. This condition may last for a maximum of 120 minutes (2 hours) after the schedule start time.

B. Contractor down-time shall be defined as the period of time between the end of the standby time and time the Contractor is allowed access to the work site. This item shall be measured by the additional work hour lost (1 hour)).

1.03 BASIS OF PAYMENT

A. Payment will be made at the contract unit price per minute or per work period depending on the item description above. This payment shall be full compensation for mobilizing and having prepared to work all personnel and equipment, for all personnel, equipment, overhead, profit and all incidentals affected by the delay or cancellation. In accepting this payment, the Contractor agrees that there can be no right to claim for any additional compensation related to delays or agrees that there can be no right to claim for any additional compensation related to delays or cancelled closures. Claims for possible time extensions on a per contract day basis would still be applicable.

A. Payment will be made under:
Item SP-8-1 – Stand-by Time – Per Minute.
Item SP-8-2 – Down Time (1 hour period) – Per Period

END OF SECTION SP-8

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following:

1. Work covered by the Contract Documents.
2. Work phases.
3. Work under other contracts.
4. Use of premises.
5. Owner's occupancy requirements.
6. Specification formats and conventions.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. Owner: Hartsfield-Jackson Atlanta International Airport.
Project Manager:
Robert Liber
Tech Campus
1255 South Loop Road
College Park, GA 30337 USA
Email: Bob.Liber@atlanta-airport.com

B. Architect:
Hartsfield-Jackson Aviation Design Collaborative
c/o Scott Associates Architects Inc.
80 Bloor St. W, Suite 1400
Toronto, ON
Canada, M5S 2V1
Attention: Stacy D. Lee
Email: sdlee@saai.ca
Or
c/o R L Brown & Associates, Inc.
250 East Ponce de Leon Avenue, 8th Floor
Decatur, GA 30030 USA
Attention: Johnny L. Edwards
Email: jledwards@rlbrown.com

C. Structural
Walter P Moore, Structural Engineer
1201 Peachtree Street, NE
400 Colony Square, suite 1600
Atlanta Georgia, 30361
Attention: Tim Santi
Email: TSanti@walterpmoore.com

C. Electrical
Ray Group
1827 Powers Ferry Road.
Atlanta Georgia, 30339
Attention: Keith Mikulka
Email: keithm@raygroup.net

D. Security & IT Systems
Faith Group, LLC
101 Lakeforest Blvd., Suite 310
Gaithersburg, Maryland 20877
Attention: Harold Flamenbaum
Email: harold@faithgroupllc.com

E. The Work consists of the following:

1. a. Installation of new painted wall finishes to the APM-Bag Claim Escalators

   b. Provision of a new LED video wall system including structure, video processors, media player, software, video wall media content, communications cabling and interfaces, CCTV Camera, two sets of system testing, electrical, and prefinished metal shroud

   c. Remove and reinstall existing light fixtures

   d. Remove and relocate existing speakers, and other work as shown on the documents

   e. Provision of new access doors at Level 3.

1.03 WORK PHASES

A. The Work associated with the Video Wall shall be conducted in multiple phases. The work shall be sequenced as follows:
   1. Sequence 1A - Erection of the scaffolding and safety /security barriers, access door security boundary partitions, Video Wall Structural Framing.
   2. Sequence 1B – Configuration, integration and testing of the Video Wall System at the Video Wall installer's facility
   3. Sequence 2 - After authorization by Airport Security; Installation of Video Wall Alarmed Access doors
   4. Sequence 3 – Installation of the Video Wall System at its specified locations at the Airport, including Video Wall Secondary Structure, video processors, content media player and fiber cable media converters and security mesh.
   5. Sequence 4 – After authorization by Airport Security; Removal of safety / security barriers and related partitions

6. Sequence 5 – Acceptance testing of the complete Video Wall System.

B. All APM- Bag Claim Escalator work must be done after hours. Escalators must be fully functional for public use during airport operation (see drawing notes for allowable escalator shut downs). Before commencing Work, submit a schedule showing the construction sequence. Video Wall Sequence 2, 3, and 5; work at the Airport, may take place during working hours with proper coordination with Airport Security.

1.04 WORK UNDER OTHER CONTRACTS

A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the Work of this Contract with work performed under separate contracts

1.05 USE OF PREMISES

A. General: Contractor shall have limited use of premises for construction operations as indicated by the Contract limits.

B. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
1. Limits: Confine constructions operations to the work areas as indicated on the drawings.
2. Owner Occupancy: Allow for full Owner occupancy of Project and full use by the public during the hours of 04:00 and 22:00 and limited occupancy during Contractor hours 22:00 to 04:00.
3. Deliveries are allowed only during the period 22:00 to 04:00.

1.06 OWNER'S OCCUPANCY REQUIREMENTS

A. Full Owner Occupancy: Owner will occupy site and adjacent areas of the West Crossover. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations and the use of the concourses, by the public. Maintain all existing exits.
1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, tenant areas, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.

B. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment, signage, wall covering, etc in completed areas of the Work before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment, signage and partial occupancy shall not constitute acceptance of the total Work.
1. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building.

1.07 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the 54-division format and CSI/CSC's "MasterFormat" numbering system.

1. Division 1: Sections in Division 1 govern the execution of the Work of all Sections in the Specifications.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.

2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

PART 1 - GENERAL

1.01 OPERATIONS

A. The Term "**Security Identification Display Area" (SIDA)** refers to a portion of the airport refers to the secured areas of the Airport where access is restricted to persons possessing and properly displaying an Airport Identification Badge. This area includes the "Air Operatons Area" (AOA) and may include other areas of the airport.

B. The Term "**Sterile Area"** refers to the portion of an airport that provides passengers access to boarding aircraft and to which the access generally is controlled by TSA through the screening of persons and property. The Sterile Areas at this airport encompasses all interior areas of the Terminal, East of the Terminal Checkpoint and all of the Concourses including the APM-Bag Claim Escelator and Exit Lane Areas.

C. The Contractor shall take all precautions necessary to insure the safety of airport operations as well as that of his own equipment and personnel. Throughout the construction period for this project, the necessary operations and functions of the airport shall be continuously maintained, except where modified in construction sequences as shown on the plans. Within the limits of the Airport property, the contractor shall operate his vehicles and equipment in a manner that will not interfere with any Airport operations.

1.02 HEIGHT OF EQUIPMENT IN ANY CLEAR ZONE

NOT APPLICABLE

1.03 PARKING, ACCESS, AND TEMPORARY FACILITIES

A. Contractor shall use only areas designated by the Owner's representative and approved by the Airport operations Manager for the parking of his employees' vehicles and the storage of equipment and materials. No private vehicles will be allowed to transport workmen to a construction site within the Airport security limits. It will be the responsibility of the Contractor to provide transportation for his workmen from the parking area to the construction site.

B. Before beginning the work of the Contract, the Contractor shall confirm with the Owner's representative which entrances, routes or roadways shall be used for access to the Work, and shall use only those designated for movement of personnel and vehicles to and from the Work.

C. Subject to the approval of the Owner's representative, the Contractor shall allocate storage and work space on the site for his own use and for the use of subcontractors. After allocation, each shall take all necessary precautions to prevent fire and to protect the space from damage, and shall bear the cost of repairs, patching, and cleaning arising from his use of such space. Each shall also protect his stored materials from theft and damage, and shall arrange the materials for ready inventory to verify quantities listed on payment requests.

1.04 HAUL ROUTES

A. Existing roads within the Airport, which are approved by the Owner's representative as haul roads, shall be maintained during use and restored to their original condition when no longer needed by the Contractor.

1.05 ELECTRICAL REPAIRS

NOT APPLICABLE

1.06 DUST CONTROL

NOT APPLICABLE

1.07 DEBRIS CONTROL

A. The Contractor shall, at all times, keep all lightweight or loose material secured so as to prevent movement caused by wind.

1.08 BARRICADES

NOT APPLICABLE

1.09 DISPOSAL OF MATERIALS

A. All waste material and rubble, including concrete (unless otherwise specified), shall be disposed of off the Airport site. All salvaged material shall become the property of the contractor. The contractor shall obtain and have available written permission from the owner of the property upon which any waste material is to be placed.

B. Debris Removal: Construction debris will be removed by dump truck. Trucks will be allowed to access to the curb staging area from 2400 hrs to 0400 hrs. Trucks will be manned at all times.

1.10 PROTECTION

A. Contractor is to take special care when moving materials, equipment and personnel through finished areas of the Terminal in order to avoid damage. Any damage caused to existing finishes to be repaired by Contractor at no cost to Owner and to Owner's satisfaction.

1.11 SAFETY AND SECURITY REQUIREMENTS

A. The Contractor is advised that the work associated with the APM- Bag Claim Escalator Wall Modifications Project and associated LED Video Wall Display System will take place over the Airport's West Cross Over Security Exit Lane, which is a security sensitive area (Sterile Area of the Airport) providing for persons to EXIT ONLY from the Automated People Mover (Plane Train) platform, which is a Sterile Area of the Airport, to public space. This Exit Lane is staffed with TSA and Law Enforcement personnel to guard against unscreened personnel and/or goods and prohibited items from entering into the Sterile Area.

B. The work scope associated with this project will require that the contractor's personnel perform work, and bring tools, materials and equipment into this area. This will require the contractor to prepare and submit for review and approval a Project Security Plan. In addition, all personnel working in sterile and secured areas of the Airport will be required to obtain an Airport Security ID Display Area (SIDA) Access ID Badge and conform to all of the Airport's Security requirements. For additional information regarding badging please go to:
http://www.atlanta- airport.com/business/security/security_services.aspx#Badge

C. Project Security Plan:

1. All personnel, materials, and equipment brought into the sterile area may be inspected to ensure that no contraband materials or prohibited items are allowed into the area. Tools brought into the area, must be inventoried such that the same tools must be removed, no tools may be left exposed and available to the public. TSA prohibited items required to perform the contractor's work may be utilized provided they are listed on the tool inventory.

2. The WCO Video Wall will be constructed over exiting passengers. Material movement into and out of the work area must take place after hours. The contractor will be required to employee safety personnel who will stop all traffic from using the escalators during the period of time that materials and equipment are being moved into and out of the work area. The contractor's security plan must be submitted and approved by Airport Security, and must document how it will carry out the safety and security requirements associated with this project. This plan must also include sections on tracking and control of personnel, material and tools.

END OF SECTION

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Contingency Allowance.

B. Payment and modification procedures relating to allowances.

C. Allowance Schedule

1.02 CONTINGENCY ALLOWANCE

A. Contractor's costs for products, delivery, installation, labor, insurance, payroll, taxes, bonding, equipment rental, overhead and profit will be included in Change Orders authorizing expenditure of funds from this Contingency Allowance.

B. Funds will be drawn from the Contingency Allowance only by Change Order.

C. At close out of the contract, funds remaining in Contingency Allowance will be credited to the owner by Change Order.

D. Expend each allowance as directed by Owner's Representative.

1.03 PAYMENT AND MODIFICATION PROCEDURES

A. Cash allowances, unless otherwise specified, cover net cost to Contractor of services, products, construction machinery and equipment, freight, handling, unloading, storage, installation and other authorized expenses incurred in performing Work.

B. Progress payments for work and material authorized under cash allowances will be made in accordance with contract terms of payment.

C. Progress payments on accounts of work authorized under cash allowances shall be included in monthly certificate for payment.

D. Schedule shall be prepared jointly by Owner's Representative and Contractor to show when items called for under cash allowances must be authorized by Owner's Representative for ordering purposes so that progress of work will not be delayed.

1.04 CASH ALLOWANCE SCHEDULE

A. Allowance No 1: Include the stipulated sum of $75,000 for all work associated with the installation of artwork. Work shall be subcontracted as directed by the DOA's Art Department.

B. Allowance No 2: Include the stipulated sum of $75,000 for additional security and maintenance of passenger flow as directed by the DOA's Security Department and/or the DOA's Operations Department.

C. Allowance No 3: Include the stipulated sum of $25,000 for software support services for the WCO video wall system. Includes Hardware/Software validation testing. This shall be part of the system's initial system configuration; proof of operation and system functional test as identified in specification 272401, and shall take place at the Video Wall Installer's facility, Includes travel and all associated testing software. Includes Professional Services and related travel and includes project management, creative services, signage architecture, implementation and systems engineering associated with the WCO video wall system, Includes all associated Video Wall templates, related programming and customized training. Work associated with this service may be billed monthly.

D. Allowance No 4: Include the stipulated sum of $50,000 for Customer Care Representative Team/Subcontractor, as may be required, to manage pedestrian traffic while barricades and/or scaffolds are in place.

E. Allowance No 5: Include the stipulated sum of $50,000 for all work associated with asbestos abatement and removal of affected existing materials; coordinate hazardous material removal with DOA.

F. Allowance No 6: Include the stipulated sum of $10,000 for AATC support as required. Support shall be approved in advance by DOA.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION (NOT APPLICABLE)

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. See Division 1 Section "Quality Requirements" for submitting test and inspection reports and for mockup requirements.

C. See Division 1 Section "Closeout Procedures" for submitting warranties.

D. See Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.

1.02 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Architect's responsive action.

B. Informational Submittals: Written information that does not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.03 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

B. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.

C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.

2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.

D. Identification: Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches on label or beside title block to record

   Contractor's review and approval markings and action taken by Architect.
3. Include the following information on label for processing and recording action taken:
   a. Project name.
   b. Date.
   c. Name and address of Architect.
   d. Name and address of Contractor.
   e. Name and address of subcontractor.
   f. Name and address of supplier.
   g. Name of manufacturer.
   h. Submittal number or other unique identifier, including revision identifier.
      1. Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06100.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06100.01.A).
   i . Number and title of appropriate Specification Section.
   j . Drawing number and detail references, as appropriate.
   k. Location(s) where product is to be installed, as appropriate.
   l . Other necessary identification.

E. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.

F. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

1. Additional copies submitted for maintenance manuals will not be marked with action taken and will be returned.

G. Transmittal: Package each submittal individually and appropriately for transmittal and handling.

Transmit each submittal using a transmittal form. Architect will discard submittals received from sources other than Contractor.

1. Transmittal Form: Use AIA Document G810.

H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked "Approved" or "Approved as Noted"
4. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
5. Use for Construction: Use only final submittals with mark indicating "Approved" or "Approved as Noted"

1.04 CONTRACTOR'S USE OF ARCHITECT'S CAD FILES

Copies of Architect's/Engineer's CAD files (except in PDF format) will be provided to the Contractor with Architect's/Engineer's seal deleted and with note: "FOR PREPARATION OF AS-BUILT DRAWINGS ONLY".

PART 2 - PRODUCTS

2.01 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

B. Field Quality Control Submittal: Contract to submit weekly QC report in form approved by CM/OM and as set out in General Conditions of the Contract.

C. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:
   a. Manufacturer's written recommendations.
   b. Manufacturer's product specifications.
   c. Manufacturer's installation instructions.
   d. Manufacturer's catalog cuts.
   e. Wiring diagrams showing factory-installed wiring.
   f. Printed performance curves.
   g. Operational range diagrams.
   h. Compliance with specified referenced standards.
   i . Testing by recognized testing agency.

4. Number of Copies: Submit three copies of Product Data, unless otherwise indicated. Architect will return two copies. Mark up and retain one returned copy as a Project Record Document.

D. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
   a. Dimensions.
   b. Identification of products.
   c. Fabrication and installation drawings.
   d. Roughing-in and setting diagrams.
   e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
   f. Shopwork manufacturing instructions.
   g. Templates and patterns.
   h. Schedules.
   i . Notation of coordination requirements.
   j . Notation of dimensions established by field measurement.
   k. Relationship to adjoining construction clearly indicated.
   l . Seal and signature of professional engineer if specified.
   m. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
3. Number of Copies: Shop drawings shall be submitted in PDF format.

E. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:
   a. Generic description of Sample.
   b. Product name and name of manufacturer.
   c. Sample source.
   d. Number and title of appropriate Specification Section.
3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
   a. Number of Samples: Submit three, except where indicated otherwise, full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
   a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned.

F. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location.

1. Number of Copies: Submit three copies of product schedule or list, unless otherwise indicated. Architect will return two copies.

G. Submittals Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."

H. Application for Payment: Comply with requirements specified in Division 1 Section "Payment Procedures."

I. Schedule of Values: Comply with requirements specified in Division 1 Section "Payment Procedures."

J. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design.

1. Number of Copies: Submit three copies of subcontractor list, unless otherwise indicated. Architect will return two copies.

2.02 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Architect will not return copies.
2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
3. Test and Inspection Reports: Comply with requirements specified in Division 1 Section "Quality Requirements."

D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

E. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

F. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

H. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

I. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

J. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment.

K. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.

L. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:

1. Statement on condition of substrates and their acceptability for installation of

product.

2. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.

M. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

N. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Architect.

1. Architect will not review submittals that include MSDSs and will return them for resubmittal.

2.03 DELEGATED DESIGN

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit three copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.01 CONSTRUCTION MANAGER REVIEW

A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of

reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.02 ARCHITECT'S ACTION

A. General: Architect will not review submittals that do not bear Contractors and/or Engineers approval stamp where required and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:

1. Approved
2. Approved as Noted - Resubmittal Not Required
3. Approved as Noted - Resubmit for Record
4. Not Approved - Resubmit
5. Action Not Required

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections include the following:

1. Division 1 Section "Allowances" for testing and inspecting allowances.
2. Division 1 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
3. Divisions 2 through 16 Sections for specific test and inspection requirements.

1.03 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Approved mockups establish the standard by which the Work will be judged.

D. Laboratory Mockups: Full-size, physical assemblies that are constructed at testing facility to verify performance characteristics.

E. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

F. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.

G. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

H. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

I. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

J. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.

K. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.04 CONFLICTING REQUIREMENTS

A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.05 SUBMITTALS

A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

B. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Description of test and inspection.
3. Identification of applicable standards.
4. Identification of test and inspection methods.
5. Number of tests and inspections required.
6. Time schedule or time span for tests and inspections.
7. Entity responsible for performing tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

C. Reports: Prepare and submit certified written reports that include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar

documents, established for compliance with standards and regulations bearing on performance of the Work.

1.06 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in Atlanta, Georgia and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.

F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirement for specialists shall not supersede building codes and regulations governing the Work.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect

installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

   a. Provide test specimens representative of proposed products and construction.
   b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
   c. Provide sizes and configurations of test assemblies, and mockups to adequately demonstrate capability of products to comply with performance requirements.
   d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.

   a. Allow seven days for initial review and each re-review of each mockup.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Mockups will be integrated into the final work.

1.07 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Payment for these services will be made by the Construction Manager.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 1 Section "Submittal Procedures."

D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.

4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within 30 calendar days of date established for the Notice to Proceed.

1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.08 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:

B. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 TEST AND INSPECTION LOG

A. Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.02 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
2. Comply with the Contract Document requirements for Division 1 Section "Cutting and Patching."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.02 DEFINITIONS

A. Temporary Enclosures: Provide temporary barriers around work areas to protect public.

1.03 USE CHARGES

A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's project representative and construction forces, Architect, testing agencies, and authorities having jurisdiction.

B. Water Service: Water from Owner's existing water system is available for use without metering and without payment of uses charges. Provide connections and extensions of services as required for construction operations.

C. Electric Power Service: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.04 SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

1.05 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFP A 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.06 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Gypsum Board: Minimum 1/2 inch thick by 48 inches wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C36/C36M.

2.02 TEMPORARY FACILITIES

A. Temporary office space for the contractor will not be provided for this project.

2.03 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

PART 3 - EXECUTION

3.01 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary services or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Water Service: Use of Owner's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

C. Electric Power Service: Use of Owner's existing electric power service will be permitted, as long as equipment is maintained in a condition acceptable to Owner.

D. Lighting: Use of Owner's existing lighting service will be permitted. If additional illumination is required, such temporary lighting to be provided by Contractor.

E. Telephone Service:

1. At each area where the work is being performed post a list of important telephone numbers including police and fire departments Contractor's home office Owner's office Principal subcontractors' field and home offices.

2. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

F. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail in field office.

3.02 SUPPORT FACILITIES INSTALLATION

A. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Maintain access for fire- fighting equipment and access to fire hydrants.

B. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to

handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 1 Section "Execution Requirements" for progress cleaning requirements.

C. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

D. Existing Elevator Use: Use of Owner's existing elevators will be permitted, as long as elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use.

1. Existing elevators shall not be used for transporting materials, personnel or tools and equipment with a combined weight in excess of 1500 pounds.
2. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.

. Existing Stair Usage: Use of Owner's existing stairs will be permitted, as long as stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If, despite such protection, stairs become damaged, restore damaged areas so no evidence remains of correction work.

3.03 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

B. Barricades, Warning Signs, and Lights: Comply with requirements of Authorities having Jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

C. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

1. Prohibit smoking in hazardous fire-exposure construction areas.

2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

D. Temporary enclosure walls shall be full height. Walls shall be dust proof. Walls shall be finished and painted gypsum wall board with 6” vinyl base at a minimum when exposed to the public. Follow DOA standards for temporary walls.

3.04 OPERATION, TERMINATION AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.

2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 1 Section "Closeout Procedures."

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

B. Related Sections include the following:

1. Divisions 2 through 48 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
2. Division 7 Section "Through-Penetration Firestop Systems" for patching fire-rated construction.

1.03 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.04 SUBMITTALS

A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 calendar days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:

1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
3. Products: List products to be used and firms or entities that will perform the Work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.

6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.05 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

1. Steel and Precast Beams
2. Structural Steel Studs

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operating elements include the following:

1. Primary operational systems and equipment.
2. Air or smoke barriers.
3. Fire-suppression systems.
4. Mechanical systems piping and ducts.
5. Control systems.
6. Communication systems.
7. Conveying systems.
8. Electrical wiring systems.
9. Operating systems of special construction in Division 13 Sections.

C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Miscellaneous elements include the following:

1. Water, moisture, or vapor barriers.
2. Membranes and flashings.
3. Exterior curtain-wall construction.
4. Equipment supports.
5. Piping, ductwork, vessels, and equipment.

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.06 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

3.03 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.

2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Warranties.
3. Final cleaning.

B See Division 1 Section "Project Record Documents" for submitting Record Drawings, Record
Specifications, and Record Product Data.

C See Divisions 2 through 48 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.02 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include operating certificates, and similar releases.
5. Prepare and submit Project Record Documents, to include CAD As-built drawing files in compliance with the CAD standards of the Hartsfield-Jackson Atlanta International Airport and as noted in Section 0781 PROJECT RECORD DOCUMENTS. Record documents shall also include operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
6. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
7. Complete final cleaning requirements, including touchup painting.
8. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, the Owner's Project Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. The Owner's Project Manager will prepare the Certificate of Substantial

Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by the Owner's Project Manager, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.03 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit certified copy of Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by the Owner's Project Manager. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
2. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, the Owner's Project Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. The Owner's Project Manager will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.04 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order.

1.05 WARRANTIES

A. Submittal Time: Warranty period shall commence on date of Substantial Performance of the Contract.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces

PART 3 EXECUTION

3.01 FINAL CLEANING

A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
   a. Clean Project site in areas disturbed by construction activities.
   b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
   c. Remove tools, construction equipment, machinery, and surplus material from Project site.
   d. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
   e. Remove labels that are not permanent.
   f. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration. 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
   g. Leave Project clean and ready for occupancy.

C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

B. See Divisions 2 through 54 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.02 SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set of marked-up Record Prints.
2. Number of Copies: Submit copies of Record Drawings as follows:
   a. Initial Submittal: Submit one plot from corrected Record CAD Drawings and one set of marked-up Record Prints. Architect will initial and date each plot and mark whether general scope of changes, additional information recorded, and quality of drafting are acceptable. Architect will return plots and prints for organizing into sets, printing, binding, and final submittal.
   b. Final Submittal: Submit one set of marked-up Record Prints, and the following:
      1) Record CAD Drawing Files and Plots: Two sets.
      2) Copies printed from Record CAD Drawing Plots: Three sets

PART 2 - PRODUCTS

2.01 MATERIALS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
   a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
   b. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
2. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
3. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Transparencies: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Architect. When authorized, prepare a full set of corrected transparencies of the Contract Drawings and Shop Drawings.

1. Incorporate changes and additional information previously marked on Record Prints. Erase, redraw, and add details and notations where applicable.
2. Refer instances of uncertainty to Architect for resolution.
3. Print the Contract Drawings and Shop Drawings for use as Record Transparencies. Architect will make the Contract Drawings available to Contractor's print shop.

C. Record CAD Drawings: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Architect. When authorized, prepare a full set of corrected CAD Drawings of the Contract Drawings, as follows:

1. Format: AutoCAD version 2012.
2. Drawings shall comply with the CAD standards of the Hartsfield-Jackson Atlanta International Airport.
3. Incorporate changes and additional information previously marked on Record Prints. Delete, redraw, and add details and notations where applicable.

D. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Record Transparencies: Organize into unbound sets matching Record Prints. Place transparencies in durable tube-type drawing containers with end caps. Mark end cap of each container with identification. If container does not include a complete set, identify Drawings included.
3. Identification: As follows:
   a. Project name.
   b. Date.
   c. Designation "PROJECT RECORD DRAWINGS."
   d. Name of Architect.
   e. Name of Contractor.

2.02 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. Note related Change Orders and Record Drawings where applicable.

2.03 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.

2.04 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.01 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:

1. Steel framing and supports for mechanical and electrical equipment.
2. Steel framing and supports for applications where framing and supports are not specified in other Sections.
3. Shelf angles.
4. Loose bearing and leveling plates.
5. Steel weld plates and angles for casting into concrete not specified in other Sections.
6. Miscellaneous stainless steel trim including steel angle corner guards and stainless steel edgings
7. Stainless steel wall base.
8. Miscellaneous stainless steel wall reveals.
9. Prefinished metal shroud at video wall

B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

1.03 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1.04 SUBMITTALS

A. Product Data: For the following:

1. Paint products.

B. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
2. Provide templates for anchors and bolts specified for installation under other Sections.
3. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Welding certificates.

D. Qualification Data: For professional engineer.

1.05 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."
2. AWS D1.3, "Structural Welding Code--Sheet Steel."
3. AWS D1.6, "Structural Welding Code--Stainless Steel."

1.06 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
2. Provide allowance for trimming and fitting at site.

1.07 COORDINATION

A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

B. Coordinate installation of steel weld plates and angles for casting into concrete that are specified in this Section but required for work of another Section. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.02 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.03 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36.

B. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304.

C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.

D. Rolled-Steel Floor Plate: ASTM A 786, rolled from plate complying with ASTM A 36 or ASTM A 283, Grade C or D.

E. Steel Tubing: ASTM A 500, cold-formed steel tubing.

F. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.

G. Slotted Channel Framing: Cold-formed metal channels with continuous slot complying with MFMA-3.

1. Size of Channels: 1-5/8 by 1-5/8 inches.
2. Material: Galvanized steel complying with ASTM A 653, commercial steel, Type B, with G90 (Z275) coating; 0.079-inch nominal thickness.

2.04 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

2.05 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Shop Primers: Provide primers that comply with Division 9 painting Sections.

C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.

1. Use primer with a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

D. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

F. Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

G. Concrete Materials and Properties: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.

2.06 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.07 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.

C. Galvanize miscellaneous framing and supports where indicated.

D. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.08 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Weld adjoining members together to form a single unit where indicated.

B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches, unless otherwise indicated.

C. Galvanize loose steel lintels located in exterior walls.

D. Prime loose steel lintels located in exterior walls with zinc-rich primer.

2.09 STAINLESS STEEL WALL BASE

A. Fabricate stainless steel wall base to match existing adjacent bases with sandstone finish to match existing.

B. Laminate onto ½" marine plywood.

Note: Refer to drawings and details for backing to wall bases.

2.10 STAINLESS STEEL WALL TRIM

A. Provide stainless steel (#4 finish) angle trim around new access doors and existing doors at ticketing level.

2.11 MISCELLANEOUS WALL REGLETS

NOT APPLICABLE

2.12 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

2.13 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:

1. ASTM A 123, for galvanizing steel and iron products.
2. ASTM A 153, for galvanizing steel and iron hardware.

B. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.14 STAINLESS-STEEL FINISHES

A. Remove tool and die marks and stretch lines or blend into finish.

B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

C. Bright, Directional Satin Finish: No. 4.

D. Sandstone finish.

E. Random swirl Sandstone finish.

F. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.15 PREFINISHED SHROUD AT VIDEO WALL

A. Provide prefinished metal shroud at video wall complete with mild steel framework for support.

B. Provide punched louvers for air ventilation as shown on the documents. Louvers on side wall shall open up to prevent view into the space behind the video modules. Louvers on bottom shall open toward the wall to prevent view.

C. Provide metal cove for continuous lighting

D. Oil canning on the metal surface will not be acceptable. Use metal thick enough to provide a flat surface.

E. Exposed fasteners will not be acceptable. All connection shall be blind.

F. Color of metal shall be black semi gloss

G. Size to be site verified, measured and coordinated with adjacent trades.

2.16 MISCELLANEOUS ITEMS

A. Provide miscellaneous items as shown on drawings including steel grating for catwalks, steel guard rails at catwalk, steel fall arrest anchors in video wall service space, security mesh around video wall AND ALL OTHER MISCELLANEOUS METAL ITEMS AS CALLED UP ON THE DRAWINGS OR REQUIRED FOR THE CONSTRUCTION.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.02 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for operable partitions securely to and rigidly brace from building structure.

C. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.

1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.

3.03 INSTALLING METAL BASE

A. Provide stainless steel wall base laminated to ½" marine plywood where indicated on drawings providing finish as indicated above. Adhere base in place with approved laminating adhesive.

3.04 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:

1. Framing with dimension lumber.
2. Rooftop bases and support curbs.
3. Wood blocking, cants, and nailers.
4. Wood furring and grounds.
5. Plywood backing panels.

1.03 DEFINITIONS

A. Rough Carpentry: Carpentry work not specified in other Sections and not exposed, unless otherwise indicated.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NELMA - Northeastern Lumber Manufacturers Association.
2. NLGA - National Lumber Grades Authority.
3. RIS - Redwood Inspection Service.
4. SPIB - Southern Pine Inspection Bureau.
5. WCLIB - West Coast Lumber Inspection Bureau.
6. WWPA - Western Wood Products Association.

1.04 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials, both before and after exposure

to elevated temperatures when tested according to ASTM D 5516 and ASTM D 5664.

3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
4. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.05 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

B. Source Limitations for Engineered Wood Products: Obtain each type of engineered wood product through one source from a single manufacturer.

C. Source Limitations for Fire-Retardant-Treated Wood: Obtain each type of fire-retardant-treated wood product through one source from a single producer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber, plywood, and other panels; place spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.01 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
4. Provide dressed lumber, S4S, unless otherwise indicated.
5. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal (38-mm actual) thickness or less, unless otherwise indicated.

2.02 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA C2 (lumber) and AWPA C9 (plywood), except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and as follows:

a. Chromated copper arsenate (CCA).

2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark each treated item with the treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

2.03 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, provide materials that comply with performance requirements in AWPA C20 (lumber) and AWPA C27 (plywood**)**. Identify fire-retardant-treated wood with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

B. **NOTE**: All wood products incorporated into the construction shall be fire retardant treated.

1. Use treatment for which chemical manufacturer publishes physical properties of treated wood after exposure to elevated temperatures, when tested by a qualified

independent testing agency according to ASTM D 5664, for lumber and ASTM D 5516, for plywood.

2. Use treatment that does not promote corrosion of metal fasteners.
3. Use Exterior type for exterior locations and where indicated.

2.04 MISCELLANEOUS LUMBER

A. General: Provide lumber for support or attachment of other construction, including the following:

1. Rooftop equipment bases and support curbs.
2. Blocking.
3. Cants.
4. Nailers.
5. Furring.
6. Grounds.

B. For items of dimension lumber size, provide Construction, Stud, or No. 2 grade lumber with 19 percent maximum moisture content and the following species:

1. Spruce-pine-fir (south) or Spruce-pine-fir; NELMA, NLGA, WCLIB, or WWPA.

C. For concealed boards, provide lumber with 19 percent maximum moisture content and the following species and grades:

1. Spruce-pine-fir (south) or Spruce-pine-fir, Construction or 2 Common grade; NELMA, NLGA, WCLIB, or WWPA.

D. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.05 PLYWOOD BACKING PANELS

A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2 inch (12.7 mm) thick.

2.06 PLYWOOD BACKING FOR BASES AND CORNER GUARDS

A. Provide fire retardant treated marine plywood backing for corner guard and bases.

2.07 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: CABO NER-272.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

F. Lag Bolts: ASME B18.2.1. (ASME B18.2.3.8M).

G. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

B. Do not use materials with defects that impair quality of rough carpentry or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

C. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.

D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. CABO NER-272 for power-driven fasteners.
2. Published requirements of metal framing anchor manufacturer.

E. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; predrill as required.

3.02 WOOD GROUND, SLEEPER, BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build anchor bolts into masonry during installation of masonry work. Where possible, secure anchor bolts to formwork before concrete placement.

3.03 WOOD FURRING INSTALLATION

A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

1. Fire block furred spaces of walls, at each floor level and at ceiling, with wood blocking or noncombustible materials accurately fitted to close furred spaces.

B. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal- size furring vertically at 16 inches o.c.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes through-penetration firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.

1.03 PERFORMANCE REQUIREMENTS

A. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.

B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E 814 or UL 1479:

1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
2. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:

    a. Penetrations located outside wall cavities.
    b. Penetrations located outside fire-resistance-rated shaft enclosures.

3. L-Rated Systems: Provide through-penetration firestop systems with L-ratings of not more than 3.0 cfm/sq. ft at both ambient temperatures and 400 deg F.

C. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.

2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by installing floor plates or by other means.
3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

D. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each through-penetration firestop system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include firestop design designation of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.

1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
2. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

C. Through-Penetration Firestop System Schedule: Indicate locations of each through-penetration firestop system, along with the following information:

1. Types of penetrating items.
2. Types of constructions penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.
3. Through-penetration firestop systems for each location identified by firestop design designation of qualified testing and inspecting agency.

D. Qualification Data: For Installer.

E. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FMG according to FMG 4991, "Approval of Firestop Contractors."

B. Installer Qualifications: A firm experienced in installing through-penetration firestop systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its through-penetration firestop system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

C. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single qualified installer.

D. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, through one source from a single manufacturer.

E. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:

1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
2. Through-penetration firestop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems complying with the following requirements:

    a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life if applicable, qualified testing and inspecting agency's classification marking applicable to Project, curing time, and mixing instructions for multi-component materials.

B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.07 PROJECT CONDITIONS

A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.08 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

C. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.

D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by Owner's inspecting agency and building inspector, if required by authorities having jurisdiction.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, through-penetration firestop systems that may be incorporated into the Work include, but are not limited to, those systems indicated on Drawings that are produced by one of the following manufacturers:

1. A/D Fire Protection Systems Inc.
2. Grace, W. R. & Co. - Conn.
3. Hilti, Inc.
4. Johns Manville.
5. Nelson Firestop Products.
6. NUCO Inc.
7. RectorSeal Corporation (The).
8. Specified Technologies Inc.
9. 3M; Fire Protection Products Division.
10. Tremco; Sealant/Weatherproofing Division.

11. USG Corporation.

2.02 FIRESTOPPING, GENERAL

A. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.

B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:

1. Permanent forming/damming/backing materials, including the following:

    a. Slag-/rock-wool-fiber insulation.
    b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
    c. Fire-rated form board.
    d. Fillers for sealants.

2. Temporary forming materials.
3. Substrate primers.
4. Collars.
5. Steel sleeves.

2.03 FILL MATERIALS

A. General: Provide through-penetration firestop systems containing the types of fill materials indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 by referencing the types of materials described in this Article. Fill materials are those referred to in directories of referenced testing and inspecting agencies as "fill," "void," or "cavity" materials.

B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.

F. Intumescent Putties: Non-hardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

H. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a non-shrinking, homogeneous mortar.

I. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives.

J. Silicone Foams: Multi-component, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.

K. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and non-sag formulation for openings in vertical and other surfaces requiring a non-slumping, gunnable sealant, unless indicated firestop system limits use to non-sag grade for both opening conditions.
2. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
3. Grade for Vertical Surfaces: Non-sag formulation for openings in vertical and other surfaces.

2.04 MIXING

A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

2.05 FIRE STOP AT CABLE TRAY

Provide firestop system at existing cable tray and cables. Employ a system that will allow additional cables to be installed or removed in the future.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of work.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with firestop system manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.03 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

C. Install fill materials for firestop systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.04 IDENTIFICATION

A. Identify through-penetration firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of edge of the firestop systems so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use mechanical fasteners for metal labels. For plastic labels, use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and, in combination with label material, will result in partial destruction of label if removal is attempted. Include the following information on labels:

1. The words "Warning - Through-Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Through-penetration firestop system designation of applicable testing and inspecting agency.
4. Date of installation.
5. Through-penetration firestop system manufacturer's name.
6. Installer's name.

3.05 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner may engage a qualified, independent inspecting agency to inspect through-penetration firestops. Independent inspecting agency shall comply with ASTM E 2174 requirements including those related to qualifications, conducting inspections, and preparing test reports.

B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.

3.06 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes joint sealants for the following applications, including those specified by reference to this Section:

1. Interior joints in the following vertical surfaces and horizontal non-traffic surfaces:

    a. Control and expansion joints on exposed interior surfaces of exterior walls.
    b. Perimeter joints of exterior openings where indicated.
    c. Tile control and expansion joints.
    d. Joints between toilet fixtures and wall.
    e. Corner joints at the wall.
    f. Other joints as indicated.

2. Interior joints in the following horizontal traffic surfaces:

    a. Other joints as indicated.

1.03 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

1.04 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

C. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.

D. SWRI Validation Certificate: For each elastomeric sealant specified to be validated by SWRI's Sealant Validation Program.

E. SWRI Validation Certificate: For each elastomeric sealant specified to be validated by SWRI's Sealant Validation Program.

F. Qualification Data: For Installer.

G. Preconstruction Field Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on preconstruction testing specified in "Quality Assurance" Article.

H. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

I. Field Test Report Log: For each elastomeric sealant application.

J. Product Test Reports: Based on comprehensive testing of product formulations performed by a qualified testing agency, indicating that sealants comply with requirements.

K. Warranties: Special warranties specified in this Section.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

C. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Submit not fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.

4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.

D. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period preceding the commencement of the Work.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
2. Test elastomeric joint sealants according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.
3. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

1.06 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.07 WARRANTY

A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: five years from date of Substantial Completion.

C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:

1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

2.02 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.03 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be non-staining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

C. Single-Component Mildew-Resistant Neutral-Curing Silicone Sealant:

1. Available Products:

a. Pecora Corporation; 898 - (Basis of Design)

2. Type and Grade: S (single component) and NS (non-sag).
3. Class: 25.
4. Use Related to Exposure: NT (non-traffic).
5. For use at high humidity interior locations including the following:
   a. Between tiles and adjacent materials.

2.04 LATEX JOINT SEALANTS

A. Latex Sealant: Comply with ASTM C 834, Type P, Grade NF.

B. Available Products:
1. Tremco; Tremflex 834 – (Basis of Design)

C. For use at general exterior locations including the following:
1. Perimeter of interior windows.
2. Perimeter of fire hose cabinets.
3. Junction between drywall and masonry.

2.05 ACOUSTICAL JOINT SEALANTS

A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard non-sag, paintable, non-staining latex sealant complying with ASTM C 834 and the following:

1. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
2. Available Products:
   a. United States Gypsum Co.; SHEETROCK Acoustical Sealant – (Basis of Design)

3. For use at acoustical partitions and locations as indicated on drawings including the following:

   a. Acoustical sealing of partitions.
   b. Acoustical sealing of corridors.

2.06 PREFORMED JOINT SEALANTS

A. Preformed Silicone-Sealant System: Manufacturer's standard system consisting of pre-cured low-modulus silicone extrusion, in sizes to fit joint widths indicated, combined with a neutral-curing silicone sealant for bonding extrusions to substrates.

1. Available Products:

   a. Dow Corning Corporation; 123 Silicone Seal.

b. GE Silicones; UltraSpan US1100.
c. Pecora Corporation; Sil-Span.
d. Tremco; Spectrem Ez Seal.

B. Preformed Foam Sealant: Manufacturer's standard preformed, pre-compressed, open-cell foam sealant that is manufactured from high-density urethane foam impregnated with a nondrying, water-repellent agent; is factory produced in pre-compressed sizes in roll or stick form to fit joint widths indicated; is coated on one side with a pressure-sensitive adhesive and covered with protective wrapping; develops a watertight and airtight seal when compressed to the degree specified by manufacturer; and complies with the following:

1. Available Products:

a. EMSEAL Joint Systems, Ltd.; Emseal 25V.
b. illbruck Sealant Systems, Inc.; Wilseal 600.
c. Polytite Manufacturing Corporation; Polytite Standard.
d. Sandell Manufacturing Co., Inc.; Polyseal.

2. Properties: Permanently elastic, mildew resistant, non-migratory, non-staining, and compatible with joint substrates and other joint sealants.

a. Density: Manufacturer's standard.

2.07 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are non-staining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.08 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.
    c. Porcelain enamel.
    d. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.03 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

F. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

G. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.

2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

    a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

H. Installation of Preformed Tapes: Install according to manufacturer's written instructions.

3.04 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed elastomeric sealant joints as follows:

    a. Perform 10 tests for the first 1000 feet of joint length for each type of elastomeric sealant and joint substrate.
    b. Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor per elevation.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab in Appendix X1 in ASTM C 1193, as appropriate for type of joint-sealant application indicated.

    a. For joints with dissimilar substrates, verify adhesion to each substrate separately; do this by extending cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

3. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field-adhesion-test log.

4. Inspect tested joints and report on the following:

    a. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
    b. Whether sealants filled joint cavities and are free of voids.
    c. Whether sealant dimensions and configurations comply with specified requirements.

5. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.

6. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

B. Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.05 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.06 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:

1. Standard hollow-metal steel doors.
2. Standard hollow-metal steel frames.

1.03 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings.

1.04 SUBMITTALS

A. Product Data: Include construction details, material descriptions, core descriptions, label compliance, fire-resistance and temperature-rise ratings, and finishes for each type of steel door and frame specified.

B. Shop Drawings: In addition to requirements below, provide a schedule of standard steel doors and frames using same reference numbers for details and openings as those on Drawings:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details.
3. Frame details for each frame type, including dimensioned profiles.
4. Details and locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, accessories, joints, and connections.
7. Details of glazing frames and stops showing glazing.
8. Details of conduit and preparations for electrified door hardware and controls.

C. Coordination Drawings: Drawings of each opening, including door and frame, drawn to scale and coordinating door hardware. Show elevations of each door design type, showing dimensions, locations of door hardware, and preparations for power, signal, and electrified control systems.

D. Samples for Initial Selection: For units with factory-applied color finishes.

E. Samples for Verification: For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches.

F. Oversize Construction Certification: For standard steel door assemblies required to be fire rated and exceeding limitations of labeled assemblies; include statement that doors comply with requirements of design, materials, and construction but have not been subjected to fire test.

G. Qualification Data: For Installer.

H. Product Test Reports: Based on evaluation of comprehensive fire tests performed by a qualified testing agency, for each type of standard steel door and frame.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Source Limitations: Obtain standard steel doors and frames through one source from a single manufacturer.

C. Fire-Rated Door Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated.

1. Test Pressure: Test at atmospheric (neutral) pressure according to NFPA 252 or UL 10B.
2. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a testing agency acceptable to authorities having jurisdiction that doors comply with standard construction requirements for tested and labeled fire-protection-rated door assemblies except for size.
3. Temperature-Rise Rating: At exit enclosures, provide doors that have a temperature-rise rating of 450 deg F maximum in 30 minutes of fire exposure.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver doors and frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to finish of factory-finished doors and frames.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store doors and frames under cover at Project site. Place units in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber.

1. If wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.07 PROJECT CONDITIONS

A. Field Measurements: Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.08 COORDINATION

A. Coordinate installation of anchorages for standard steel frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Fleming Door Products Ltd.; an ASSA ABLOY Group Company – (Basis of Design)

2.02 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653, Commercial Steel (CS), Type B; with minimum A40 (ZF180) zinc-iron-alloy (galvannealed) coating designation.

D. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591, Commercial Steel (CS), Class B coating; mill phosphatized.

E. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls according to ASTM A 153, Class B.

F. Inserts, Bolts, and Fasteners: Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A 153.

G. Grout: Comply with ASTM C 476, with a slump of 4 inches for standard steel door frames built into concrete or masonry, as measured according to ASTM C 143.

H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-developed indexes of 25 and 50 respectively; passing ASTM E 136 for combustion characteristics.

I. Glazing: Comply with requirements in Division 8 Section "Glazing."

J. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.03 STANDARD STEEL DOORS

A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces, unless otherwise indicated. Comply with ANSI A250.8.

1. Design: Flush panel.
2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, mineral-board, or vertical steel-stiffener core that produces doors complying with ANSI A250.8.

    a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.

        1) Locations: Exterior doors and interior doors where indicated.

3. Vertical Edges for Single-Acting Doors: Square edge unless beveled edge is indicated.

    a. Beveled Edge: 1/8 inch in 2 inches.

4. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch radius.
5. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- thick end closures or channels of same material as face sheets.
6. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

B. Interior Doors: Face sheets fabricated from cold-rolled steel sheet, unless otherwise indicated to comply with exterior door requirements. Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:

1. Level 1 and Physical Performance Level C, (Standard Duty), Model 1 (Full Flush).
2. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush).

C. Hardware Reinforcement: Fabricate reinforcement plates from same material as door face sheets to comply with the following minimum sizes:

1. Hinges: Minimum 0.123 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
2. Pivots: Minimum 0.167 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
3. Lock Face, Closers, and Concealed Holders: Minimum 0.067 inch thick.
4. All Other Surface-Mounted Hardware: Minimum 0.067 inch thick.

D. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.04 STANDARD STEEL FRAMES

A. General: Comply with ANSI A250.8 and with details indicated for type and profile.

B. Interior Frames: Fabricated from cold-rolled steel sheet, unless otherwise indicated to comply with exterior frame requirements.

1. Fabricate frames with mitered or coped and welded face corners, unless otherwise indicated.
2. Frames for Level 1 Steel Doors: 0.053-inch- thick steel sheet, unless otherwise indicated.
3. Frames for Level 2 Steel Doors: 0.053-inch- thick steel sheet, unless otherwise indicated.
4. Frames for Level 3 Steel Doors: 0.053-inch- thick steel sheet, unless otherwise indicated.

C. Hardware Reinforcement: Fabricate reinforcement plates from same material as frames to comply with the following minimum sizes:

1. Hinges: Minimum 0.123 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
2. Pivots: Minimum 0.167 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
3. Lock Face, Closers, and Concealed Holders: Minimum 0.067 inch thick.
4. All Other Surface-Mounted Hardware: Minimum 0.067 inch thick.

D. Supports and Anchors: Fabricated from electrolytic zinc-coated or metallic-coated steel sheet.

E. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Post-installed Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

F. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

G. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

2.05 STOPS AND MOLDINGS

A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick, fabricated from same material as door face sheet in which they are installed.

B. Fixed Frame Moldings: Formed integral with standard steel frames, minimum 5/8 inch high, unless otherwise indicated.

C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed.

2.06 FABRICATION

A. General: Fabricate standard steel doors and frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Standard Steel Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
2. Glazed Lites: Factory cut openings in doors.

C. Standard Steel Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
2. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints; fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners, unless otherwise indicated.
4. Where installed in masonry, leave vertical mullions in frames open at top for grouting.
5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
6. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Two anchors per jamb up to 60 inches in height.
        2) Three anchors per jamb from 60 to 90 inches in height.
        3) Four anchors per jamb from 90 to 120 inches in height.
        4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof more than 120 inches in height.

    b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:

        1) Three anchors per jamb up to 60 inches in height.
        2) Four anchors per jamb from 60 to 90 inches in height.
        3) Five anchors per jamb from 90 to 96 inches in height.
        4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof more than 96 inches in height.
        5) Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.

    c. Post-installed Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Provide plastic plugs to keep holes clear during construction.

    a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

D. Hardware Preparation: Factory prepare standard steel doors and frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."

1. Reinforce doors and frames to receive nontemplated mortised and surface-mounted door hardware.
2. Comply with applicable requirements in ANSI A250.6 and ANSI/DHI A115 Series specifications for door and frame preparation for hardware. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.

E. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of door or frame.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings such that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of doors and frames.
5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.07 STEEL FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Finish standard steel door and frames after assembly.

B. Metallic-Coated Steel Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.

1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

C. Steel Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning"; remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel; comply with SSPC-SP 3, "Power Tool Cleaning," or SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

D. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 0.7 mils.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied finish paint system indicated; and providing a sound foundation for field-applied topcoats despite prolonged exposure.

E. Factory-Applied Paint Finish: Manufacturer's standard, complying with ANSI A250.3 for performance and acceptance criteria.

1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of standard steel doors and frames.

1. Examine roughing-in for embedded and built-in anchors to verify actual locations of standard steel frame connections before frame installation.
2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Remove welded-in shipping spreaders installed at factory.

B. Prior to installation and with installation spreaders in place, adjust and securely brace standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:

1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.

2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive nontemplated mortised and surface-mounted door hardware.

3.03 INSTALLATION

A. General: Provide doors and frames of sizes, thicknesses, and designs indicated. Install standard steel doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Standard Steel Frames: Install standard steel frames for doors, sidelights and other openings, of size and profile indicated. Comply with SDI 105.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. At fire-protection-rated openings, install frames according to NFPA 80.
    b. Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    c. Install frames with removable glazing stops located on secure side of opening.
    d. Install door silencers in frames before grouting.
    e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    f. Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    g. Apply bituminous coating to backs of frames that are filled with mortar, grout, and plaster containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor and secure with post-installed expansion anchors.
3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar as specified in Division 4 Section "Unit Masonry Assemblies."
5. Concrete Walls: Solidly fill space between frames and concrete with grout. Install grout in lifts and take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.

6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
8. Ceiling Struts: Extend struts vertically from top of frame at each jamb to supporting construction above, unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction above. Provide adjustable wedged or bolted anchorage to frame jamb members.
9. Installation Tolerances: Adjust standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Standard Steel Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

    a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
    b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

D. Glazing: Comply with installation requirements of standard steel door and frame manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c., and not more than 2 inches o.c. from each corner.

3.04 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including standard steel doors or frames that are warped, bowed, or otherwise unacceptable.

B. Clean grout and other bonding material off standard steel doors and frames immediately after installation.

C. Galvannealed Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes items known commercially as finish or door hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.

B. This Section includes the following:

1. Hinges
2. Lock cylinders and keys
3. Lock and latch sets
4. Closers

C. Related Sections: The following Sections contain requirements that relate to this Section:

1. Section 08 1113: Hollow Metal Doors and Frames
2. Division 26: Electrical

D. Products furnished but not installed under this Section to include:

1. Final replacement cores and keys to be installed by Owner.

1.03 REFERENCES

A. Standards of the following as referenced:

1. American National Standards Institute (ANSI)
2. Door and Hardware Institute (DHI)
3. Factory Mutual (FM)
4. National Fire Protection Association (NFPA)
5. Underwriters' Laboratories, Inc. (UL)
   a. UL 10C - Fire Tests Door Assemblies
6. Warnock Hersey

B. Regulatory standards of the following as referenced:

1. Department of Justice, Office of the Attorney General, *Americans with Disabilities Act*, Public Law 101-336 (ADA).

2. CABO/ANSI A117.1: *Providing Accessibility and Usability for Physically Handicapped People*, 1992 edition.

1.04 SYSTEM DESCRIPTION

A. Refer to applicable “Headings” for system description for electric and electro-pneumatic hardware products.

1.05 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification sections.

B. Product data including manufacturers' technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements. For items other than those scheduled in the “Headings” of Section 3, provide catalog information for the specified items and for those submitted.

C. Final hardware schedule coordinated with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Final Hardware Schedule Content: Based on hardware indicated, organize schedule into vertical format “hardware sets" indicating complete designations of every item required for each door or opening. Use specification Heading numbers with any variations suffixed a, b, etc. Include the following information:
   a. Type, style, function, size, and finish of each hardware item.
   b. Name and manufacturer of each item.
   c. Fastenings and other pertinent information.
   d. Location of each hardware set cross-referenced to indications on Drawings both on floor plans and in door and frame schedule.
   e. Explanation of all abbreviations, symbols, and codes contained in schedule.
   f. Mounting locations for hardware.
   g. Door and frame sizes and materials.
   h. Keying information.
   i. Cross-reference numbers used within schedule deviating from those specified.
      1) Column 1: State specified item and manufacturer.
      2) Column 2: State prior approved substituted item and its manufacturer.

2. Furnish complete wiring diagrams, riser diagrams, elevation drawings and operational descriptions of electrical components and systems, listed by opening in the hardware submittals. Elevation drawings shall identify locations of the system components with respect to their placement in the door opening.

Operational descriptions shall fully detail how each electrical component will function within the opening, including all conditions of ingress and egress. Provide a copy with each hardware schedule submitted for approval. Supply a copy with delivery of hardware to the jobsite and another copy to the Owner at the time of project completion.

3. Submittal Sequence: Submit final schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work that is critical in the Project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by door hardware, and other information essential to the coordinated review of schedule.
4. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.

D. Samples of each type of exposed hardware unit in finish indicated and tagged with full description for coordination with schedule. Submit samples prior to submission of final hardware schedule.

1. Samples will be returned to the supplier. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated in the Work, within limitations of keying coordination requirements.

E. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

F. Contract closeout submittals:

1. Operation and maintenance data: Complete information for installed door hardware.
2. Warranty: Completed and executed warranty forms.

1.06 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain each type of hardware (latch and locksets, hinges, closers, etc.) from a single manufacturer.

B. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that employs an experienced Architectural Hardware Consultant (AHC) who is available for consultation to Owner, Architect, and Contractor, at reasonable times during the course of the Work.

C. Coordination Meetings:

1. Supplier shall set up and attend the following:
   a. Supplier to meet with the Owner to finalize lock functions and keying requirements and to obtain final instructions in writing.
   b. Supplier to meet with the installer prior to beginning of installation of door hardware.
2. General Contractor shall set up and attend the following:
   a. Supplier to meet with the Owner, General Contractor, electrical and security contractors to coordinate all electrical hardware items. Supplier to provide riser diagrams, elevation drawings, wiring diagrams and operational descriptions as required by the General and sub-contractors.

D. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and tested by UL or Warnock Hersey for given type/size opening and degree of label. Provide proper latching hardware, door closers, approved-bearing hinges and seals whether listed in the Hardware Schedule or not. All hardware shall comply with standards UBC 702 (1997) and UL 10C.

1. Where emergency exit devices are required on fire-rated doors, (with supplementary marking on doors' UL labels indicating "Fire Door to be equipped with Fire Exit Hardware") provide UL label on exit devices indicating "Fire Exit Hardware".

E. All hardware is to comply with Federal and State Handicap laws. Provide tactile warning at the back of all outside levers to electrical, mechanical, machine rooms and doors that lead to hazardous areas.

1.07 PRODUCT HANDLING

A. Tag each item or package separately with identification related to final hardware schedule, and include basic installation instructions with each item or package.

B. Packaging of door hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets may be packed in same container.

C. Inventory door hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

D. Deliver individually packaged door hardware items promptly to place of installation (shop or Project site).

E. Provide secure lock-up for door hardware delivered to the Project, but not yet

installed. Control handling and installation of hardware items that are not immediately replaceable so that completion of the Work will not be delayed by hardware losses both before and after installation.

1.08 WARRANTY

A. Special warranties:

1. Door Closers: Ten year period
2. Exit Devices: Three year period
3. Locks and Cylinders: Three year period

1.09 MAINTENANCE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Parts kits: Furnish manufacturers' standard parts kits for locksets, exit devices, and door closers.

PART 2 - PRODUCTS

2.01 MANUFACTURED UNITS

A. Hinges:

1. Acceptable manufacturers:
   a. Ives – (Basis of Design)

2. Characteristics:
   a. Templates: Provide only template-produced units.
   b. Screws: Provide Phillips flat-head screws complying with the following requirements:
      1) For metal doors and frames install machine screws into drilled and tapped holes.
      2) For wood doors and frames install threaded-to-the-head wood screws.
      3) For fire-rated wood doors install #12 x 1-1/4 inch, threaded-to-the-head steel wood screws.
      4) Finish screw heads to match surface of hinges or pivots.
   c. Hinge pins: Except as otherwise indicated, provide hinge pins as follows:
      1) Out-Swing Exterior Doors: Non-removable pins.
      2) Out-Swing Corridor Doors with Locks: Non-removable pins.
      3) Interior Doors: Non-rising pins.
      4) Tips: Flat button and matching plug. Finished to match leafs.

d. Size: Size hinges in accordance with specified manufacturer's published recommendations.
e. Quantity: Furnish one pair of hinges for all doors up to 5'-0" high. Furnish one hinge for each additional 2-1/2 feet or fraction thereof.

B. Cylinders:

1. High-Security Lock Cylinders: BHMA A156.30, Grade 1
   a. Key Control Level: Category A.
   b. Destructive Test Level: Category A.
   c. Surreptitious Entry Resistance Level: Category A.
2. Acceptable manufacturers:
   a. Best Locking System Series 1E7, keyed to existing system
3. Characteristics:
   a. Existing System: Grandmaster key the locks to the Owner's existing Best Lock system. Coordinate with DoA Security.
   b. Review the keying system with the Owner and provide the type required (master, grandmaster or great-grandmaster), either new or integrated into Owner's existing system.
   c. Furnish final cores and keys for installation by Owner.
   d. Metals: Construct lock cylinder parts from brass or bronze, stainless steel, or nickel silver.
   e. Comply with Owner's instructions for master keying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.
      1) Permanently inscribe each key with number of lock that identifies cylinder manufacturer's key symbol, and notation, "DO NOT DUPLICATE."
   f. Key Material: Provide keys of nickel silver only.
   g. Key Quantity: Furnish 3 change keys for each lock. WCO Video Wall Access Doors shall be Keyed Alike. Provide 5 keys for each door.
      1) Furnish one extra blank for each lock.
      2) Furnish construction master keys to General Contractor.
      3) Deliver keys to Owner.

C. Locksets, Latchsets, Deadbolts:

1. Acceptable manufacturers:
   a. Corbin/Russwin
   b. Sargent
   c. Best
   d. Schlage
2. Mortise Locksets and Latchsets: as scheduled.
   a. Chassis: Cold-rolled steel, handing field-changeable without disassembly.
   b. Latchbolts: 3/4-inch throw stainless steel anti-friction type.

c. Lever Trim: Through-bolted, accessible design, cast or solid rod lever as scheduled. Spindles: Independent break-away.
d. Thumbturns: Accessible design not requiring pinching or twisting motions to operate.
e. Deadbolts: Stainless steel 1-inch throw.
f. Electric operation: Manufacturer-installed continuous duty solenoid.
g. Strikes: 16 gage curved stainless steel, bronze or brass with 1" deep box construction, lips of sufficient length to clear trim and protect clothing.
h. Scheduled Lock Series and Design: Schlage L series, 93A design.
i. Certifications:
   1) ANSI A156.13, 1994, Grade 1 Operational, Grade 1 Security.
   2) ANSI/ASTM F476-84 Grade 30 UL Listed.

D. Closers and Door Control Devices:

1. Acceptable manufacturers:
   a. LCN Closers – (Basis of Design)
2. Characteristics:
   a. Door closers shall have fully hydraulic, full rack and pinion action with a high strength cast iron cylinder.
   b. All closers shall utilize a stable fluid withstanding temperature range of 120^{o}F to -30^{o}F without seasonal adjustment of closer speed to properly close the door. Closers for fire-rated doors shall be provided with temperature stabilizing fluid that complies with standards UBC 7-2 (1997) and UL 10C.
   c. Spring power shall be continuously adjustable over the full range of closer sizes, and allow for reduced opening force for the physically handicapped. Spring power adjustment (LCN Fast ™ Power Adjust) allows for quick and accurate power adjustment and visually shows closer power size settings by way of dial adjustment gauge located on closer spring tube. Hydraulic regulation shall be by tamper-proof, non-critical valves. Closers shall have separate adjustment for latch speed, general speed and back check.
   d. All closers shall have solid forged steel main arms (and forearms for parallel arm closers) and where specified shall have a cast-in solid stop on the closer shoe (“CUSH”). All parallel arm mounted closers shall have “EDA” type arms or, where door travel on out-swing doors must be limited, use “CUSH” or “SCUSH” type closers. Auxiliary stops are not required when “CUSH” type closers are used.
   e. Overhead concealed closers shall have spring power adjustable for 50% increase in closing power and fully mortised door tracks.
   f. All surface closers shall be certified to exceed ten million (10,000,000) full load cycles by a recognized independent testing laboratory. All closers (overhead, surface and concealed) shall be of one manufacturer and carry manufacturer's ten year warranty (electric closers to have two year warranty).

g. Access-Free Manual Closers: Where manual closers are indicated for doors required to be accessible to the physically handicapped provide adjustable units complying with ADA and ANSI A-117.1 provisions for door opening force.

h. Closers to be installed to allow door swing as shown on plans. Doors swinging into exit corridors shall provide for corridor clear width as required by code. Where possible, mount closers inside rooms.

i. Powder coating finish to be certified to exceed 100 hours salt spray testing by ETL, an independent testing laboratory used by BHMA for ANSI certification.

2.02 MATERIALS AND FABRICATION

A. Manufacturer's Name Plate: Do not use manufacturers' products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise acceptable to Architect.

1. Manufacturer's identification will be permitted on rim of lock cylinders only.

B. Base Metals: Produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units by applicable ANSI/BHMA A156 series standards for each type of hardware item and with ANSI/BHMA A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods for those indicated, except as otherwise specified.

C. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.

1. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.
2. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including “prepared for paint" surfaces to receive painted finish.
3. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent no standard units of type specified are available with concealed fasteners.
4. Do not use thru-bolts or sex bolts for installation where bolt head or nut on opposite face is exposed in other work unless their use is the only means of adequately fastening the hardware, or otherwise found in Headings. Coordinate with wood doors and metal doors and frames. Where thru-bolts are used, provide sleeves for each thru-bolt as a means of reinforcing the work, or use sex screw fasteners.

2.03 HARDWARE FINISHES

A. Match items to the manufacturer's standard color and texture finish for the latch and lock sets (or push-pull units if no latch or lock sets).

B. Provide finishes that match those established by ANSI or, if none established, match the Architect's sample.

C. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.

D. Provide protective lacquer coating on all exposed hardware finishes of brass, bronze, and aluminum, except as otherwise indicated. The suffix "-NL" is used with standard finish designations to indicate "no lacquer."

E. The designations used to indicate hardware finishes are those listed in ANSI/BHMA A156.18, "Materials and Finishes," including coordination with the traditional U.S. finishes shown by certain manufacturers for their products.

1. Continuous Hinges: 628 (US28) Clear Anodized Aluminum
2. Locks: 630 (US32D) Satin Stainless Steel
3. Door Closers: 689 Powder Coat Aluminum

2.04 HARDWARE

HW SET: 1

DOOR NUMBER:
302 303 (LH/RH)
EACH TO HAVE:

3	HINGES	5BB1	IVE
1	STOREROOM LOCK	L9080L	SCH
1	SURFACE CLOSER	4011	LCN
1	KICK PLATE	8400 10"	IVE
1	OVERHEAD STOP	90S	GLY
1	SET SEALS	5050	NGP

HW SET: 10

DOOR NUMBER:
301 304 (LH/RH)
EACH TO HAVE:

3	HINGES	5BB1	IVE
1	CLASSROOM LOCK	L9010	SCH
1	DOOR POSITION SWITCH	2757	GE
1	MORTISE CYLINDER	1E74	BES
1	SURFACE CLOSER	4011	LCN

1	KICK PLATE	8400 10"	IVE
1	OVERHEAD STOP	90S	GLY
1	SET SEALS	5050	NGP
1	DOOR SWEEP	C627A	NGP

NOTE: 1) PERMANENT BEST REMOVABLE CORE
2) CONFIRM FUNCTION OF EXISTING FINISHING DOOR HARDWARE

PART 3 - EXECUTION

3.01 INSTALLATION

A. Mount hardware units at heights indicated in following applicable publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by Architect.

1. "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.
2. "Recommended Locations for Builders Hardware for Custom Steel Doors and Frames" by the Door and Hardware Institute.
3. NWWDA Industry Standard I.S.1.7, "Hardware Locations for Wood Flush Doors."

B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 9 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.

C. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

E. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements specified in Division 7 Section “Joint Sealers”.

F. Weatherstripping and Seals: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

3.02 ADJUSTING, CLEANING, AND DEMONSTRATING

A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.

1. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to function properly with final operation of heating and ventilating equipment.

B. Clean adjacent surfaces soiled by hardware installation.

C. Door Hardware Supplier's Field Service:

1. Inspect door hardware items for correct installation and adjustment after complete installation of door hardware.
2. Instruct Owner's personnel in the proper adjustment and maintenance of door hardware and hardware finishes.
3. File written report of this inspection to Architect.

D. Door Hardware Manufacturer’s Field Service:

1. Prior to project completion, representatives of the lock, exit device and overhead closer manufacturers shall inspect and certify that all units are installed in accordance with the manufacturer’s instructions, and are regulated properly and functioning correctly.
2. A written report of the inspection results and recommendations shall be provided to the Architect and shall include the appropriate certificates.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:

1. Interior gypsum wallboard.
2. Tile backing panels.
3. Non-load-bearing steel framing.

1.03 DEFINITIONS

A. Gypsum Board Terminology: Refer to ASTM C 11 for definitions of terms for gypsum board assemblies not defined in this Section or in other referenced standards.

1.04 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show locations, fabrication, and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other units of Work.

C. Samples: For the following products:

1. Trim Accessories: Full-size sample in 12-inch- long length for each trim accessory indicated.
2. Textured Finishes: Manufacturer's standard size for each textured finish indicated and on same backing indicated for Work.

1.05 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance-Rated Assemblies: Indicated by design designations from UL's "Fire Resistance Directory."

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat to prevent sagging.

1.07 PROJECT CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products of the following:

1. Steel Framing and Furring:

    a. National Gypsum Company – (Basis of Design)

2. Gypsum Board and Related Products:

    a. American Gypsum Co. – (Basis of Design)

2.02 STEEL SUSPENDED CEILING FRAMING

A. Components, General: Comply with ASTM C 754 for conditions indicated.

B. Tie Wire: ASTM A 641, Class 1 zinc coating, soft temper, 0.0625-inch- diameter wire, or double strand of 0.0475-inch- diameter wire.

C. Hanger Attachments to Concrete: As follows:

1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching hanger wires and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by a qualified independent testing agency.

    a. Type: Post-installed, expansion anchor.

2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by a qualified independent testing agency.

D. Hangers: As follows:

1. Wire Hangers: ASTM A 641, Class 1 zinc coating, soft temper, 0.162-inch diameter.
2. Rod Hangers: ASTM A 510, mild carbon steel.

    a. Diameter: 1/4-inch.
    b. Protective Coating: ASTM A 153, hot-dip galvanized.

3. Flat Hangers: Commercial-steel sheet, ASTM A 653, G60, hot-dip galvanized.

    a. Size: 1 by 3/16 inch by length indicated.

E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base metal thickness of 0.0538 inch, a minimum 1/2-inch- wide flange, with ASTM A 653, G60, hot-dip galvanized zinc coating.

1. Depth: 2-1/2 inches.

F. Furring Channels (Furring Members): Commercial-steel sheet with ASTM A 653, G60, hot-dip galvanized zinc coating.

1. Cold Rolled Channels: 0.0538-inch bare steel thickness, with minimum 1/2-inch-wide flange, 3/4 inch deep.
2. Steel Studs: ASTM C 645.

    a. Minimum Base Metal Thickness: 0.0179 inch.
    b. Depth: As indicated.

3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.

    a. Minimum Base Metal Thickness: 0.0179 inch.

4. Resilient Furring Channels: 1/2-inch- deep members designed to reduce sound transmission.

    a. Configuration: Asymmetrical or hat shaped, with face attached to single flange by a slotted leg (web) or attached to two flanges by slotted or expanded metal legs.

2.03 STEEL PARTITION FRAMING

A. Components, General: As follows:

1. Comply with ASTM C 754 for conditions indicated.
2. Steel Sheet Components: Complying with ASTM C 645 requirements for metal and with ASTM A 653, G60, hot-dip galvanized zinc coating.

B. Steel Studs and Runners: ASTM C 645.

1. Minimum Base Metal Thickness: 0.0179 inch.
2. Depth: As indicated.

C. Deep-Leg Deflection Track: ASTM C 645 top runner with 2-inch- deep flanges.

D. Proprietary Deflection Track: Steel sheet top runner manufactured to prevent cracking of gypsum board applied to interior partitions resulting from deflection of structure above; in thickness indicated for studs and in width to accommodate depth of studs.

1. Available Product: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

   a. Delta Star, Inc., Superior Metal Trim; Superior Flex Track System (SFT) – (Basis of Design)

E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base Metal Thickness: 0.0179 inch.

F. Cold-Rolled Channel Bridging: 0.0538-inch bare steel thickness, with minimum 1/2-inch- wide flange.

1. Depth: 1-1/2 inches.
2. Clip Angle: 1-1/2 by 1-1/2 inch, 0.068-inch- thick, galvanized steel.

G. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Minimum Base Metal Thickness: 0.0179 inch.
2. Depth: As indicated.

H. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission.

1. Configuration: Asymmetrical or hat shaped, with face attached to single flange by a slotted leg (web) or attached to two flanges by slotted or expanded metal legs.

I. Cold-Rolled Furring Channels: 0.0538-inch bare steel thickness, with minimum 1/2-inch- wide flange.

1. Depth: 3/4 inch.
2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare steel thickness of 0.0312 inch.
3. Tie Wire: ASTM A 641, Class 1 zinc coating, soft temper, 0.0625-inch- diameter wire, or double strand of 0.0475-inch- diameter wire.

J. Z-Shaped Furring: With slotted or non-slotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum bare metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

K. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

2.04 INTERIOR GYPSUM WALLBOARD

A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

B. Gypsum Wallboard: ASTM C 36.

1. Regular Type:

a. Thickness: 5/8 inch, unless otherwise indicated.
b. Long Edges: Tapered.
c. Location: Vertical surfaces, unless otherwise indicated.

2. Type X:

a. Thickness: 5/8 inch.
b. Long Edges: Tapered.
c. Location: Where required for fire-resistance-rated assembly.

C. Sag-Resistant Gypsum Wallboard: ASTM C 36, manufactured to have more sag resistance than regular-type gypsum board.

1. Thickness: 1/2 inch.
2. Long Edges: Tapered.
3. Location: Ceiling surfaces.

D. Proprietary Abuse-Resistant Gypsum Wallboard: ASTM C 36, manufactured to produce greater resistance to surface indentation and through-penetration than standard gypsum panels.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

    a. National Gypsum Company; Gold Bond Hi-Abuse Wallboard – (Basis of Design)

2. Core: 5/8" inch, regular type.
3. Long Edges: Tapered.
4. Location: Service corridors.

E. Shaftwall Construction: Use shaftwall construction where a fire rating is required and where access to the back of wall is restricted. See drawings for locations.

2.05 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
2. Shapes:

    a. Cornerbead: Use at outside corners, unless otherwise indicated.
    b. Bullnose Bead: Use where required.
    c. LC-Bead: J-shaped; exposed long flange receives joint compound; use at exposed panel edges.
    d. L-Bead: L-shaped; exposed long leg receives joint compound; use where required.
    e. Expansion (Control) Joint: Use where indicated.
    f. Curved-Edge Cornerbead: With notched or flexible flanges; use at curved openings.

2.06 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475.

B. Joint Tape:

1. Interior Gypsum Wallboard: Paper.
2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints**,** rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.

2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.

    a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use setting-type, sandable topping compound.
5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

D. Joint Compound for Tile Backing Panels:

1. Water-Resistant Gypsum Backing Board: Use setting-type taping and setting-type, sandable topping compounds.
2. Cementitious Backer Units: As recommended by manufacturer.

2.07 ACOUSTICAL SEALANT

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Acoustical Sealant for Exposed and Concealed Joints:

    a. Pecora Corp.; AC-20 FTR Acoustical and Insulation Sealant – (Basis of Design)

2. Acoustical Sealant for Concealed Joints:
    a. Tremco, Inc.; Tremco Acoustical Sealant – (Basis of Design)

B. Acoustical Sealant for Exposed and Concealed Joints: Nonsag, paintable, nonstaining, latex sealant complying with ASTM C 834 that effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

C. Acoustical Sealant for Concealed Joints: Nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.

2.08 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Suspended Ceilings: Coordinate installation of ceiling suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers at spacing required to support ceilings and that hangers will develop their full strength.

1. Furnish concrete inserts and other devises indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials:

1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed-on fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of gypsum board assemblies and without reducing the fire-resistive material thickness below that which is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

3.03 INSTALLING STEEL FRAMING, GENERAL

A. Installation Standards: ASTM C 754, and ASTM C 840 requirements that apply to framing installation.

B. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with gypsum board manufacturer's written recommendations or, if none available, with United States Gypsum's "Gypsum Construction Handbook."

C. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement.

1. Isolate ceiling assemblies where they abut or are penetrated by building structure.
2. Isolate partition framing and wall furring where it abuts structure, except at floor. Install slip-type joints at head of assemblies that avoid axial loading of assembly and laterally support assembly.

a. Use deep-leg deflection track where indicated.
b. Use proprietary deflection track where indicated.
c. Use proprietary firestop track where indicated.

D. Do not bridge building control and expansion joints with steel framing or furring members. Frame both sides of joints independently.

3.04 INSTALLING STEEL PARTITION FRAMING

A. Install tracks (runners) at floors, ceilings, and structural walls and columns where gypsum board assemblies abut other construction.

B. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.

1. Cut studs 1/2 inch short of full height to provide perimeter relief. Do not fasten studs to top track to allow independent movement of studs and track.
2. For fire-resistance-rated partitions that extend to the underside of floor/roof slabs and decks or other continuous solid-structure surfaces to obtain ratings, install framing around structural and other members extending below floor/roof slabs and decks, as needed to support gypsum board closures and to make partitions continuous from floor to underside of solid structure.

a. Terminate partition framing at suspended ceilings where indicated.

C. Install steel studs and furring at the following spacings:

1. Single-Layer Construction: 16 inches o.c., unless otherwise indicated.
2. Multilayer Construction: 16 inches o.c., unless otherwise indicated.
3. Cementitious Backer Units: 16 inches o.c., unless otherwise indicated.

D. Install steel studs so flanges point in the same direction and leading edge or end of each panel can be attached to open (unsupported) edges of stud flanges first.

E. Frame door openings to comply with GA-600 and with gypsum board manufacturer's applicable written recommendations, unless otherwise indicated. Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

1. Install two studs at each jamb, unless otherwise indicated.
2. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint.
3. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

F. Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

G. Z-Furring Members:

1. Erect insulation vertically and hold in place with Z-furring members spaced 24 inches o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

3.05 APPLYING AND FINISHING PANELS, GENERAL

A. Gypsum Board Application and Finishing Standards: ASTM C 840 and GA-216.

B. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.

C. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

D. Install gypsum panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

E. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

F. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

G. Attach gypsum panels to framing provided at openings and cutouts.

H. Form control and expansion joints with space between edges of adjoining gypsum panels.

I. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect open concrete coffers, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffers, joists, and other structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

J. Isolate perimeter of non-load-bearing gypsum board partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

K. STC-Rated Assemblies: Seal construction at perimeters, behind control and expansion joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.

L. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's written recommendations.

M. Space fasteners in panels that are tile substrates a maximum of 8 inches o.c.

3.06 PANEL APPLICATION METHODS

A. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

    a. Stagger abutting end joints not less than one framing member in alternate courses of board.
    b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.

3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.

B. Multilayer Application on Ceilings: Apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints 1 framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.

C. Multilayer Application on Partitions/Walls: Apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.

1. Z-Furring Members: Apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.

D. Single-Layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.

E. Multilayer Fastening Methods: Fasten base layers and face layers separately to supports with screws.

F. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

G. Tile Backing Panels:

1. Cementitious Backer Units: ANSI A108.11, at locations indicated to receive tile.
2. Where tile backing panels abut other types of panels in the same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.07 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.

3.08 FINISHING GYPSUM BOARD ASSEMBLIES

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints**,** rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:

1. Level 1: Embed tape at joints in ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
2. Level 4: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges at panel surfaces that will be exposed to view, unless otherwise indicated.

E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.09 FIELD QUALITY CONTROL

A. Above-Ceiling Observation: Before Contractor installs gypsum board ceilings, Architect will conduct an above-ceiling observation and report deficiencies in the Work observed. Do not proceed with installation of gypsum board to ceiling support framing until deficiencies have been corrected.

1. Notify Architect seven days in advance of date and time when Project, or part of Project, will be ready for above-ceiling observation.
2. Before notifying Architect, complete the following in areas to receive gypsum board ceilings:

    a. Installation of 80 percent of lighting fixtures, powered for operation.
    b. Installation, insulation, and leak and pressure testing of water piping systems.
    c. Installation of air-duct systems.
    d. Installation of air devices.
    e. Installation of mechanical system control-air tubing.
    f. Installation of ceiling support framing.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces.

1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.

1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.

C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

1. Prefinished items include the following factory-finished or stainless steel components:

a. Elevator entrance doors and frames.
b. Elevator equipment.
c. Finished mechanical and electrical equipment.
d. Light fixtures.

2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:

a. Foundation spaces.
b. Furred areas.
c. Ceiling plenums.
d. Utility tunnels.
e. Pipe spaces.
f. Duct shafts.
g. Elevator shafts.

3. Finished metal surfaces include the following:

    a. Anodized aluminum.
    b. Stainless steel.

4. Operating parts include moving parts of operating equipment and the following:

    a. Valve and damper operators.
    b. Linkages.
    c. Sensing devices.
    d. Motor and fan shafts.

5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

1.03 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.

1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

1.04 SUBMITTALS

A. Product Data: For each paint system indicated. Include block fillers and primers.

1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.

B. Samples for Initial Selection: For each type of finish-coat material indicated.

1. After color selection, Architect will furnish color chips for surfaces to be coated.

C. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.

1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
2. Provide a list of materials and applications for each coat of each Sample. Label each Sample for location and application.

D. Qualification Data: For Applicator.

1.05 QUALITY ASSURANCE

A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.

C. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample for each type of coating and substrate required. Comply with procedures specified in PDCA P5. Duplicate finish of approved sample Submittals.

1. Architect will select one room or surface to represent surfaces and conditions for application of each type of coating and substrate.

   a. Wall Surfaces: Provide samples on at least 100 sq. ft. (9 sq. m).
   b. Small Areas and Items: Architect will designate items or areas required.

2. Apply benchmark samples, according to requirements for the completed Work, after permanent lighting and other environmental services have been activated. Provide required sheen, color, and texture on each surface.

   a. After finishes are accepted, Architect will use the room or surface to evaluate coating systems of a similar nature.

3. Final approval of colors will be from benchmark samples.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:

1. Product name or title of material.

2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.
8. VOC content.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.07 PROJECT CONDITIONS

A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F.

B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F.

C. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.08 EXTRA MATERIALS

A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.

1. Quantity: Furnish Owner with an additional 3 percent, but not less than 1 gal. or 1 case, as appropriate, of each material and color applied.

1.09 MOCK UPS

A. The Contractor shall produce a mock-up for all paint colors.

B. Mock-up shall be 5’ x 5’ in selected color and gloss.

C. Provide for a minimum of three (3) mock-ups with different color selections/variations.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

B. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:

1. Benjamin Moore & Co. (Benjamin Moore) – (Basis of Design)

2.02 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

C. Colors: Match Architect's samples.

2.03 CONCRETE UNIT MASONRY BLOCK FILLERS

A. Concrete Unit Masonry Block Filler: Factory-formulated high-performance latex block fillers.

1. Benjamin Moore; Moorcraft Super Craft Latex Block Filler No. 285: Applied at a dry film thickness of not less than 8.1 mils – (Basis of Design).

2.04 INTERIOR PRIMERS

A. Interior Concrete and Masonry Primer: Factory-formulated alkali-resistant acrylic-latex interior primer for interior application.

1. Benjamin Moore; Moorcraft Super Spec Latex Enamel Undercoater & Primer Sealer No. 253: Applied at a dry film thickness of not less than 1.2 mils – (Basis of Design).

B. Interior Gypsum Board Primer: Factory-formulated latex-based primer for interior application.

1. Benjamin Moore; Moorcraft Super Spec Latex Enamel Undercoater & Primer Sealer No. 253: Applied at a dry film thickness of not less than 1.2 mils – (Basis of Design).

C. Interior Ferrous-Metal Primer: Factory-formulated quick-drying rust-inhibitive alkyd-based metal primer.

1. Benjamin Moore; Moore's IMC Alkyd Metal Primer No. M06: Applied at a dry film thickness of not less than 2.0 mils – (Basis of Design).

D. Interior Zinc-Coated Metal Primer: Factory-formulated galvanized metal primer.

1. Benjamin Moore; Moore's IMC Acrylic Metal Primer No. M04: Applied at a dry film thickness of not less than 2.0 mils – (Basis of Design).

2.05 INTERIOR FINISH COATS

A. Interior Flat Latex-Emulsion Size: Factory-formulated flat latex-based interior paint.

1. Benjamin Moore; Moorecraft Super Spec Latex Flat No. 275: Applied at a dry film thickness of not less than 1.2 mils – (Basis of Design).

B. Interior Low-Luster Acrylic Enamel: Factory-formulated eggshell acrylic-latex interior enamel.

1. Benjamin Moore; Moorcraft Super Spec Latex Eggshell Enamel No. 274: Applied at a dry film thickness of not less than 1.3 mils – (Basis of Design).

C. Interior Semigloss Acrylic Enamel: Factory-formulated semigloss acrylic-latex enamel for interior application.

1. Benjamin Moore; Moorcraft Super Spec Latex Semi-Gloss Enamel No. 276: Applied at a dry film thickness of not less than 1.2 mils – (Basis of Design).

D. Interior Full-Gloss Acrylic Enamel: Factory-formulated full-gloss acrylic-latex interior enamel.

1. Benjamin Moore; Moore's IMC Acrylic Gloss Enamel No. M28: Applied at a dry film thickness of not less than 2.0 mils – (Basis of Design).

E. Interior Semigloss Alkyd Enamel: Factory-formulated semigloss alkyd enamel for interior application.

1. Benjamin Moore; Moorcraft Super Spec Alkyd Semi-Gloss Enamel No. 271: Applied at a dry film thickness of not less than 1.4 mils – (Basis of Design).

F. Interior Full-Gloss Alkyd Enamel for Gypsum Board: Factory-formulated full-gloss alkyd interior enamel.

1. Benjamin Moore; Moore's IMC Urethane Alkyd Enamel No. M22: Applied at a dry film thickness of not less than 2.0 mils – (Basis of Design).

G. Interior Full-Gloss Alkyd Enamel for Metal Surfaces: Factory-formulated full-gloss alkyd interior enamel.

1. Benjamin Moore; Moore's IMC Urethane Alkyd Enamel No. M22: Applied at a dry film thickness of not less than 2.0 mils – (Basis of Design).

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application.

1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.

3.02 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning.

1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.
2. Cementitious Materials: Prepare concrete, concrete unit masonry, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.

    a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
    b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces if moisture content exceeds that permitted in manufacturer's written instructions.
    c. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.

3. Ferrous Metals: Clean un-galvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.

    a. Blast steel surfaces clean as recommended by paint system manufacturer.
    b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
    c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.

4. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

D. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
3. Use only thinners approved by paint manufacturer and only within recommended limits.

E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.03 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
3. Provide finish coats that are compatible with primers used.
4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar
5. components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
6. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
7. Paint interior surfaces of ducts with a flat, non-specular black paint where visible through registers or grilles.
8. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
9. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
10. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
11. Sand lightly between each succeeding enamel or varnish coat.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth,

even surface according to manufacturer's written instructions, sand between applications.

2. Omit primer over metal surfaces that have been shop primed and touchup painted.
3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.

E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.

F. Mechanical items to be painted include, but are not limited to, the following:

1. Un-insulated metal piping.
2. Un-insulated plastic piping.
3. Pipe hangers and supports.
4. Tanks that do not have factory-applied final finishes.
5. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
6. Duct, equipment, and pipe insulation having "all-service jacket" or other paintable jacket material.
7. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

G. Electrical items to be painted include, but are not limited to, the following:

1. Switchgear.
2. Panelboards.
3. Electrical equipment that is indicated to have a factory-primed finish for field painting.

H. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

I. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of

J. suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

K. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

L. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.04 FIELD QUALITY CONTROL

A. Owner reserves the right to invoke the following test procedure at any time and as often as Owner deems necessary during the period when paint is being applied:

1. Owner will engage a qualified independent testing agency to sample paint material being used. Samples of material delivered to Project will be taken, identified, sealed, and certified in the presence of Contractor.
2. Owner may direct Contractor to stop painting if test results show material being used does not comply with specified requirements. Contractor shall remove non-complying paint from Project site, pay for testing, and repaint surfaces previously coated with the non-complying paint. If necessary, Contractor may be required to remove non-complying paint from previously painted surfaces if, on repainting with specified paint, the two coatings are incompatible.

3.05 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

3.06 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.

1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. The electrical work commences with the point of electrical service owned by the utility company and includes furnishing all material and labor for a complete electrical installation.

B. The requirements of Division 01 apply to all work hereunder. The General and Special Conditions are a part of this Division of the Specifications and all provisions contained therein which affect this work are as binding as though incorporated herein.

1.02 DEFINITIONS

A. Provide: Furnish, install, and connect.

B. Product Data: Catalog cuts and descriptive literature.

C. Shop Drawings: Factory prepared specific to the installation.

D. Indicated: Shown on the Drawings.

E. Noted: Indicated or specified elsewhere.

1.03 SUBMITTALS

A. Make all submittals in accordance with the requirements of Division 01. Approval drawings consist of shop drawings, product data and other information as noted in the individual equipment sections. Except as noted, submittal information is for approval and equipment may not be installed until submittals have been returned with stamped approval.

B. Information required “for reference” such as product samples, similar unit test reports and time current curves is for the purpose of determining the suitability of a product, selecting breaker settings, etc. This information is to be submitted at the same time as approval data; however, this information will not be returned and stamped approval is not required prior to installation.

C. Except as noted, installation instructions are not required to be submitted. However, it is the Contractor’s responsibility to obtain installation information from the manufacturer for all equipment prior to installing the equipment.

1.04 CLOSEOUT SUBMITTALS

A. Furnish record drawings in accordance with the requirements of Division 01. Record drawings consist of submittal data as listed above, operation and maintenance data, and as-built drawings. Record drawings are to reflect the final installation, including

any changes during approval, manufacturing test, and installation.

B. In addition to other required sets, furnish one set of operation and maintenance data for all apparatus requiring service. This set is to be bound in hardback, 3-ring binder(s) located in a hinged metal cabinet in the main electrical room and shall include:

1. Title page with project name; installing Contractor's name, address and telephone number; date of installation and warranty period.
2. Index sheet.
3. Complete manufacturer's operation and maintenance data with tabs (corresponding to the index) separating each item or system. Include the name, address and telephone number of the nearest sales and service organization for each item.
4. Coordination Study.

C. As-Built Drawings: Furnish one set of prints maintained at the job site at all times with all changes during construction marked thereon. Include on the as-built drawings sufficient dimensions to permit location of underground conduits.

D. Submit the results of any test required in the individual equipment sections.

1.05 QUALITY ASSURANCE

A. Provide the complete electrical installation in accordance with the National Electrical Code (NFPA 70), Life Safety Code (NFPA 101), NFPA 30 and in accordance with applicable local codes. Obtain all necessary permits and have all work inspected by appropriate authorities.

B. All products shall be designed, manufactured, and tested in accordance with industry standards. Where applicable, date for industry standards is that in effect on the date of Advertisement of the Project.

PART 2 PRODUCTS

2.01 MATERIALS (NOT FURNISHED)

A. Unless otherwise noted, the following are furnished and installed under other Division:

1. Motors.
2. Electric heating and air conditioning equipment.
3. Building energy management systems.
4. Electrical heat tracing.
5. Pilot and control devices for the above equipment

B. Power wiring and equipment connections for the above items are included in this Division. Also included in this Division is control wiring to the extent shown of the Drawings.

2.02 MANUFACTURED UNITS

A. Provide only new products of the manufacturer's latest design. Products shall be UL listed and shall bare the UL label.

PART 3 EXECUTION

3.01 INSTALLATION

A. The complete installation is to be accomplished by skilled electrical tradesmen, with certified or suitably qualified individuals performing all special systems installation and testing. All workmanship shall be of the highest quality, sub-standard work will be rejected.

B. Schedule the work and cooperate with all trades to avoid delays, interferences, and unnecessary work. If any conflicts occur necessitating departures from the Drawings and Specifications, details of departures and reasons therefore shall be submitted immediately for the Engineer's consideration.

C. Prior to final inspection, clean all dirt, mud and construction debris from all boxes, cabinets, manholes and equipment enclosures.

3.02 DEMONSTRATION

A. Prior to request for final review, test all systems and repair or replace all defective work. Submit, with request for final review, written certification that all electrical systems are complete and operational.

B. Insulation resistance measurements shall be made on conductors and energized parts of electrical equipment. Minimum acceptable values of insulation resistance shall be in accordance with the applicable ICEA, NEMA or ANSI standards for the equipment or material being tested, unless otherwise specified. The ambient temperature at which insulation resistance is measured shall be recorded on the test form.

C. At the time of final review of electrical work, demonstrate the operation of electrical systems. Furnish labor, apparatus and equipment for systems' demonstration.

D. After final review and acceptance, turn over to the Owner all keys for electrical equipment locks. Present to the Owner or the Owner's representative, demonstrations and oral instructions for proper operation and maintenance of the electrical equipment and systems.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. Section includes building wire and cable; and wiring connectors and connections.

B. Related Sections:

1. Section 26 05 53 - Identification for Electrical Systems: Product requirements for wire identification.

1.02 REFERENCES

A. International Electrical Testing Association:

1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

B. National Fire Protection Association:

1. NFPA 70 - National Electrical Code.

1.03 SYSTEM DESCRIPTION

A. Product Requirements: Provide products as follows:

1. Solid conductor for feeders and branch circuits 10 AWG and smaller.
2. Stranded conductors for feeders and branch circuits 8 AWG and larger.
3. Conductor not smaller than 12 AWG for power and lighting circuits.
4. Increase wire size in branch circuits to limit voltage drop to a maximum of 3 percent.

B. Wiring Methods: Provide the following wiring methods:

1. Use only building wire, Type THHN/THWN insulation, in raceway.

1.04 SUBMITTALS

A. Product Data: Submit for building wire and wiring connectors.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with State of Georgia’s standard.

B. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 BUILDING WIRE

A. Manufacturers:

1. American Insulated Wire Corp.
2. Colonial Wire.
3. AETNA.
4. Southwire.

B. Product Description: Single conductor insulated wire.

C. Conductor: Copper.

D. Insulation Voltage Rating: 600 volts.

E. Insulation Temperature Rating: 90 degrees C.

F. Insulation Material: Thermoplastic.

2.02 WIRING CONNECTORS

A. Split Bolt Connectors:

1. 3M.
2. Ideal Industries.
3. Panduit.
4. Thomas & Betts.

B. Solderless Pressure Connectors:

1. 3M.
2. Ideal Industries.
3. Panduit.
4. Thomas & Betts.

C. Spring Wire Connectors:

1. 3M.
2. Ideal Industries.
3. Panduit.
4. Thomas & Betts.

D. Compression Connectors:

1. 3M.
2. Ideal Industries.
3. Panduit.
4. Thomas & Betts.

2.03 TERMINATIONS

A. Terminal Lugs for Wires 6 AWG and Smaller: Solderless, compression type copper.

B. Lugs for Wires 4 AWG and Larger: Color keyed, compression type copper, with insulating sealing collars.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify interior of building has been protected from weather.

B. Verify mechanical work likely to damage wire and cable has been completed.

C. Verify raceway installation is complete and supported.

3.02 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.

3.03 EXISTING WORK

A. Remove exposed abandoned wire and cable. Patch surfaces where removed cables pass through building finishes.

B. Disconnect abandoned circuits and remove circuit wire and cable. Remove abandoned boxes when wire and cable servicing boxes is abandoned and removed. Install blank cover for abandoned boxes not removed.

C. Provide access to existing wiring connections remaining active and requiring access. Modify installation or install access panel.

D. Extend existing circuits using materials and methods compatible with existing electrical installations, or as specified.

E. Clean and repair existing wire and cable remaining or wire and cable to be reinstalled.

3.04 INSTALLATION

A. Route wire and cable to meet Project conditions.

B. Neatly train and lace wiring inside boxes, equipment, and panelboards.

C. Identify and color code wire and cable under provisions of Section 26 05 53. Identify each conductor with its circuit number or other designation indicated.

D. Special Techniques--Building Wire in Raceway:

1. Pull conductors into raceway at same time.
2. Install building wire 4 AWG and larger with pulling equipment.

E. Special Techniques - Wiring Connections:

1. Clean conductor surfaces before installing lugs and connectors.
2. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
3. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.
4. Install split bolt connectors for copper conductor splices and taps, 6 AWG and larger.
5. Install solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
6. Install insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

F. Install stranded conductors for branch circuits 10 AWG and smaller. Install crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under screws.

G. Install terminal lugs on ends of 600 volt wires unless lugs are furnished on connected device, such as circuit breakers.

H. Size lugs in accordance with manufacturer's recommendations terminating wire sizes. Install 2-hole type lugs to connect wires 4 AWG and larger to copper bus bars.

I. For terminal lugs fastened together such as on motors, transformers, and other apparatus, or when space between studs is small enough that lugs can turn and touch each other, insulate for dielectric strength of 2-1/2 times normal potential of circuit.

3.05 WIRE COLOR

A. General:

1. For wire sizes 10 AWG and smaller, install wire colors in accordance with the following:

   a. Black and red for single phase circuits at 120/240 volts.
   b. Black, red, and blue for circuits at 120/208 volts single or three phase.
   c. Orange, brown, and yellow for circuits at 277/480 volts single or three phase.

2. For wire sizes 8 AWG and larger, identify wire with colored tape at terminals, splices and boxes. Colors are as follows:

a. Black and red for single phase circuits at 120/240 volts.
b. Black, red, and blue for circuits at 120/208 volts single or three phase.
c. Orange, brown, and yellow for circuits at 277/480 volts single or three phase.

B. Neutral Conductors: White. When two or more neutrals are located in one conduit, individually identify each with proper circuit number.

C. Branch Circuit Conductors: Install three or four wire home runs with each phase uniquely color coded.

D. Feeder Circuit Conductors: Uniquely color code each phase.

E. Ground Conductors:

1. For 6 AWG and smaller: Green.
2. For 4 AWG and larger: Identify with green tape at both ends and visible points including junction boxes.

3.06 FIELD QUALITY CONTROL

A. Perform inspections and tests listed in NETA ATS.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Grounding conductors.

1.02 REFERENCES

A. Institute of Electrical and Electronics Engineers:

1. IEEE 1100 - Recommended Practice for Powering and Grounding Electronic Equipment.

B. International Electrical Testing Association:

1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

C. National Fire Protection Association:

1. NFPA 70 - National Electrical Code.

D. Telecommunication Industry Association/Electronic Industries Alliance:

1. TIA/EIA 607 - Commercial Building Grounding and Bonding Requirements for Telecommunications.

1.03 SUBMITTALS

A. Product Data: Submit for grounding conductor.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with State of Georgia's standard.

B. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

C. Installer: Company specializing in performing work of this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 GROUNDING CONDUCTOR

A. Material: Copper.

B. Grounding Conductor: Copper conductor insulated.

C. Bonding Conductor: Copper conductor insulated.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with IEEE, TIA/EIA 607, and NFPA 70.

B. Install isolated grounding conductor for circuits supplying personal computers in accordance with IEEE.

C. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

D. Accomplish grounding of electrical system by using insulated grounding conductor installed with feeders and branch circuit conductors in conduits. Size grounding conductors in accordance with NEC. Install from grounding bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes or metal enclosures of service equipment. Ground conduits by means of grounding bushings on terminations at panelboards with installed number 12 conductor to grounding bus.

E. Install grounding for equipment using 6 AWG THHN, rated for 90 degrees C, insulated, copper stranded conductor to copper communication grounding bus bar located in main telecommunications entrance facility.

F. Bond backbone cabling at each sheath opening.

3.02 FIELD QUALITY CONTROL

A. Grounding and Bonding: Perform inspections and tests listed in NETA ATS.

B. When improper grounding is found on receptacles, check receptacles in entire project and correct. Perform retest.

C. Test in accordance with TIA/EIA 607 and NFPA 70.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Conduit supports.
2. Formed steel channel.
3. Spring steel clips.
4. Sleeves.
5. Mechanical sleeve seals.

1.02 REFERENCES

A. National Fire Protection Association:

1. NFPA 70 - National Electrical Code.

1.03 SUBMITTALS

A. Product Data: Submit manufacturers catalog data including load capacity.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with State of Georgia's standard.

B. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

C. Installer: Company specializing in performing work of this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 CONDUIT SUPPORTS

A. Hanger Rods: Threaded high tensile strength galvanized carbon steel with free running threads.

B. Beam Clamps: Malleable Iron, with tapered hole in base and back to accept either bolt or hanger rod. Set screw: hardened steel.

C. Conduit clamps for trapeze hangers: Galvanized steel, notched to fit trapeze with single bolt to tighten.

D. Conduit clamps - general purpose: One hole malleable iron for surface mounted conduits.

E. Cable Ties: High strength nylon temperature rated to 185 degrees F (85 degrees C). Self locking.

2.02 FORMED STEEL CHANNEL

A. Manufacturers:

1. Allied Tube & Conduit Corp.
2. B-Line Systems.
3. Unistrut Corp.

B. Product Description: Galvanized 12 gage) thick steel. With holes 1-1/2 inches on center.

2.03 SPRING STEEL CLIPS

A. Furnish materials in accordance with State of Georgia's standards.

B. Product Description: Mounting hole and screw closure.

2.04 SLEEVES

A. Furnish materials in accordance with State of Georgia's standards.

B. Sleeves Through Non-fire Rated Floors: 18 gage thick galvanized steel.

C. Sleeves Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage thick galvanized steel.

D. Sleeves Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed.

E. Fire-stopping Insulation: Glass fiber type, non-combustible.

2.05 MECHANICAL SLEEVE SEALS

A. Furnish materials in accordance with State of Georgia's standards.

B. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

PART 3 EXECUTION

3.01 INSTALLATION - HANGERS AND SUPPORTS

A. Anchors and Fasteners:

1. Concrete Structural Elements: Provide precast inserts, expansion anchors, powder actuated anchors and preset inserts.
2. Steel Structural Elements: Provide beam clamps, spring steel clips, steel

ramset fasteners, and welded fasteners.

3. Concrete Surfaces: Provide self-drilling anchors and expansion anchors.
4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Provide toggle bolts and hollow wall fasteners.
5. Solid Masonry Walls: Provide expansion anchors and preset inserts.
6. Sheet Metal: Provide sheet metal screws.
7. Wood Elements: Provide wood screws.

B. Inserts:

1. Install inserts for placement in concrete forms.
2. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut flush with top of slab.

C. Install conduit and raceway support and spacing in accordance with NEC.

D. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.

E. Install multiple conduit runs on common hangers.

F. Supports:

1. Fabricate supports from structural steel or formed steel channel. Install hexagon head bolts to present neat appearance with adequate strength and rigidity. Install spring lock washers under nuts.
2. Install surface mounted cabinets and panelboards with minimum of four anchors.
3. In wet and damp locations install steel channel supports to stand cabinets and panelboards 1 inch off wall.
4. Support vertical conduit at every floor.

3.02 INSTALLATION - SLEEVES

A. Exterior watertight entries: Seal with adjustable interlocking rubber links.

B. Conduit penetrations not required to be watertight: Sleeve and fill with silicon foam.

C. Set sleeves in position in forms. Provide reinforcing around sleeves.

D. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

E. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.

F. Where conduit or raceway penetrates floor, ceiling, or wall, close off space between conduit or raceway and adjacent work with fire stopping insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

G. Install chrome plated steel escutcheons at finished surfaces.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. Section includes conduit and tubing, surface raceways, wireways, outlet boxes, pull and junction boxes.

B. Related Sections:

1. Section 26 05 26 - Grounding and Bonding.
2. Section 26 05 29 - Hangers and Supports.
3. Section 26 05 53 - Electrical Identification.
4. Section 26 27 26 - Wiring Devices.

1.02 REFERENCES

A. American National Standards Institute:

1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
2. ANSI C80.3 - Specification for Electrical Metallic Tubing, Zinc Coated.

B. National Electrical Manufacturers Association:

1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
2. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
3. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

1.03 SYSTEM DESCRIPTION

A. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.

B. Wet and Damp Locations: Provide rigid steel conduit. Provide cast metal outlet, junction, and pull boxes. Provide flush mounting outlet box in finished areas.

C. Concealed Dry Locations: Provide electrical metallic tubing. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.

D. Exposed Dry Locations: Provide rigid steel conduit. Provide cast metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.

1.04 DESIGN REQUIREMENTS

A. Minimum Raceway Size: 3/4 inch unless otherwise specified.

1.05 SUBMITTALS

A. Product Data: Submit for the following:

1. Metal conduit.
2. Electrical metallic tubing.
3. Raceway fittings.
4. Conduit bodies.
5. Pull and junction boxes.

B. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

PART 2 PRODUCTS

2.01 METAL CONDUIT

A. Manufacturers:

1. Allied Tube & Conduit.
2. Republic Conduit.
3. Wheatland Tube.

B. Rigid Steel Conduit: ANSI C80.1.

C. Fittings and Conduit Bodies: NEMA FB 1; material to match conduit.

2.02 FLEXIBLE METAL CONDUIT

A. Manufacturers:

1. Anaconda SEALTITE.
2. Southwire.
3. Electri-Flex Co.

B. Product Description: Interlocked steel construction.

C. Fittings: NEMA FB 1.

2.03 ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:

1. Allied Tube & Conduit.
2. Republic Conduit.
3. Wheatland Tube.

B. Product Description: ANSI C80.3; galvanized tubing.

C. Fittings and Conduit Bodies: NEMA FB 1; steel or malleable iron, compression type.

2.04 OUTLET BOXES

A. Manufacturers:

1. Cooper Crouse Hinds.
2. Raco Products.
3. Steel City Products.

B. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.

1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2 inch male fixture studs where required.
2. Concrete Ceiling Boxes: Concrete type.

C. Cast Boxes: NEMA FB 1, Type FD, cast feralloy. Furnish gasketed cover by box manufacturer. Furnish threaded hubs.

D. Wall Plates for Finished Areas: As specified in Section 26 27 26.

E. Wall Plates for Unfinished Areas: Furnish gasketed cover.

2.05 PULL AND JUNCTION BOXES

A. Manufacturers:

1. Cooper Crouse Hinds.
2. Raco Products.
3. Steel City Products.

B. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

C. Hinged Enclosures:

D. Surface Mounted Cast Metal Box: NEMA 250, Type 4 flat-flanged, surface mounted junction box:

1. Material: Galvanized cast iron.
2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

3.02 EXISTING WORK

A. Remove exposed abandoned raceway. Cut raceway flush with walls and floors, and patch surfaces.

B. Remove concealed abandoned raceway to its source.

C. Disconnect abandoned outlets and remove devices. Remove abandoned outlets when raceway is abandoned and removed. Install blank cover for abandoned outlets not removed.

D. Maintain access to existing boxes and other installations remaining active and requiring access. Modify installation or provide access panel.

E. Extend existing raceway and box installations using materials and methods compatible with existing electrical installations, or as specified.

F. Clean and repair existing raceway and boxes to remain or to be reinstalled.

3.03 INSTALLATION

A. Ground and bond raceway and boxes in accordance with Section 26 05 26.

B. Fasten raceway and box supports to structure and finishes in accordance with Section 26 05 29.

C. Identify raceway and boxes in accordance with Section 26 05 53.

D. Arrange raceway and boxes to maintain headroom and present neat appearance.

3.04 INSTALLATION - RACEWAY

A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.

B. Arrange raceway supports to prevent misalignment during wiring installation.

C. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

D. Group related raceway; support using conduit rack. Construct rack using steel channel specified in Section 26 05 29; provide space on each for 25 percent additional raceways.

E. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports

F. Do not attach raceway to ceiling support wires or other piping systems.

G. Construct wireway supports from steel channel specified in Section 26 05 29.

H. Route exposed raceway parallel and perpendicular to walls.

I. Route raceway installed above accessible ceilings parallel and perpendicular to walls.

J. Route conduit in and under slab from point-to-point.

K. Maximum Size Conduit in Slab Above Grade: 3/4 inch. Do not cross conduits in slab larger than 1/2 inch.

L. Maintain clearance between raceway and piping for maintenance purposes.

M. Maintain 12 inch clearance between raceway and surfaces with temperatures exceeding 104 degrees F.

N. Cut conduit square using saw or pipe cutter; de-burr cut ends.

O. Bring conduit to shoulder of fittings; fasten securely.

P. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for minimum 20 minutes.

Q. Install conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.

R. Install no more than equivalent of three 90 degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams. Install hydraulic one-shot bender to fabricate elbows for bends in metal conduit larger than 2 inch size.

S. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.

T. Install fittings to accommodate expansion and deflection where raceway crosses control and expansion joints.

U. Install suitable pull string or cord in each empty raceway except sleeves and nipples.

V. Install suitable caps to protect installed conduit against entrance of dirt and moisture.

W. Surface Raceway: Install flat-head screws, clips, and straps to fasten raceway channel to surfaces; mount plumb and level. Install insulating bushings and inserts at connections to outlets and corner fittings.

X. Close ends and unused openings in wireway.

3.05 INSTALLATION - BOXES

A. Install wall mounted boxes at elevations to accommodate mounting heights as indicated on Drawings.

B. Adjust box location up to 10 feet prior to rough-in to accommodate intended purpose.

C. Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26.

D. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

E. In Accessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.

F. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

G. Do not install flush mounting box back-to-back in walls; install with minimum 6 inches separation. Install with minimum 24 inches separation in acoustic rated walls.

H. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

I. Install stamped steel bridges to fasten flush mounting outlet box between studs.

J. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

K. Install adjustable steel channel fasteners for hung ceiling outlet box.

L. Do not fasten boxes to ceiling support wires or other piping systems.

M. Support boxes independently of conduit.

N. Install gang box where more than one device is mounted together. Do not use sectional box.

O. Install gang box with plaster ring for single device outlets.

3.06 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements.

B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket.

C. Locate outlet boxes to allow luminaires positioned as indicated on Drawings.

D. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

3.07 ADJUSTING

A. Adjust flush-mounting outlets to make front flush with finished wall material.

B. Install knockout closures in unused openings in boxes.

3.08 CLEANING

A. Clean interior of boxes to remove dust, debris, and other material.

B. Clean exposed surfaces and restore finish.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Nameplates.
2. Labels.
3. Wire markers.
4. Conduit markers.
5. Stencils.

1.02 SUBMITTALS

A. Product Data:

1. Submit manufacturer's catalog literature for each product required.

1.03 QUALITY ASSURANCE

A. Perform Work in accordance with State of Georgia's standard.

B. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

C. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 NAMEPLATES

A. Product Description: Laminated three-layer plastic with engraved black letters on white contrasting background color.

B. Letter Size:
1. 1/8 inch high letters for identifying individual equipment and loads.
2. 1/4 inch high letters for identifying grouped equipment and loads.

C. Minimum nameplate thickness: 1/8 inch.

2.02 LABELS

A. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background.

2.03 WIRE MARKERS

A. Description: Cloth tape, split sleeve, or tubing type wire markers.

B. Legend:

1. Power and Lighting Circuits: Branch circuit or feeder number as indicated on Drawings.
2. Control Circuits: Control wire number as indicated on shop drawings.

2.04 CONDUIT AND RACEWAY MARKERS

A. Description: Labels fastened with adhesive; Stencils.

B. Color:

1. 480 Volt System: Black lettering on white background.
2. 208 Volt System: Black lettering on white background.
3. Telephone System: Blue lettering on white background.

C. Legend:

1. 480 Volt System: 480 VOLTS.
2. 208 Volt System: 208 VOLTS.
3. Telephone System: TELEPHONE.

2.05 STENCILS

A. Stencils: With clean cut symbols and letters of following size:

1. Up to 2 inches Outside Diameter of Raceway: 1/2 inch high letters.
2. 2-1/2 to 6 inches Outside Diameter of Raceway: 1 inch high letters.

B. Stencil Paint: Semi-gloss enamel, colors conforming to the following:

1. Black lettering on white background.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

A. Install identifying devices after completion of painting.

B. Nameplate Installation:

1. Install nameplate parallel to equipment lines.
2. Install nameplate for each electrical distribution and control equipment enclosure with corrosive-resistant mechanical fasteners, or adhesive.
3. Install nameplates for each control panel and major control components located outside panel with corrosive-resistant mechanical fasteners, or adhesive.
4. Secure nameplate to equipment front using screws, rivets, or adhesive.

5. Secure nameplate to inside surface of door on recessed panelboard in finished locations.
6. Install nameplates for the following:

    a. Switchboards.
    b. Panelboards.
    c. Transformers.
    d. Service Disconnects.

C. Label Installation:

1. Install label parallel to equipment lines.
2. Install label for identification of individual control device stations.
3. Install labels for permanent adhesion and seal with clear lacquer.

D. Wire Marker Installation:

1. Install wire marker for each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection.
2. Mark data cabling at each end. Install additional marking at accessible locations along the cable run.
3. Install labels at data outlets identifying patch panel and port designation.

E. Conduit and Raceway Marker Installation:

1. Install conduit and raceway marker for each conduit and raceway longer than 6 feet.
2. Conduit and Raceway Marker Spacing: 20 feet on center.
3. Raceway Painting: Identify conduit using field painting.

    a. Paint colored band on each conduit longer than 6 feet.
    b. Paint bands 20 feet on center.
    c. Color:

        1) 480 Volt System: Blue.
        2) 208 Volt System: Yellow.
        3) Telephone System: Green.

F. Stencil Installation:

1. Apply stencil painting.

END OF SECTION

PART 1- GENERAL

1.01 SUMMARY

A. Section includes dry type transformers.

B. Related Sections:

1. Section 26 05 33 - Raceway and Boxes.

1.02 REFERENCES

A. National Electrical Manufacturers Association:

1. NEMA ST 20 - Dry Type Transformers for General Applications.

B. International Electrical Testing Association:

1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.03 SUBMITTALS

A. Product Data: Submit outline and support point dimensions of enclosures and accessories, unit weight, voltage, kVA, and impedance ratings and characteristics, tap configurations, insulation system type, and rated temperature rise.

B. Test Reports: Indicate loss data, efficiency at 25, 50, 75 and 100 percent rated load, and sound level.

1.04 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of transformers.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store in clean, dry space. Maintain factory wrapping or provide additional canvas or plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

PART 2- PRODUCTS

2.01 DRY TYPE TRANSFORMERS

A. Manufacturers:

1. Cutler Hammer
2. GE Electrical
3. Siemens
4. Square D

B. Product Description: NEMA ST 20, factory-assembled, air-cooled, dry type transformers, ratings as indicated on Drawings.

C. Primary Voltage: 480 volts, 3 phase.

D. Secondary Voltage: 208Y/120 volts, 3 phase.

E. Insulation system and average winding temperature rise for rated kVA as follows:

1. 1-15 kVA: Class 185 with 115 degrees C rise.
2. 16-500 kVA: Class 220 with 150 degrees C rise.

F. Case temperature: Do not exceed 35 degrees C rise above ambient at warmest point at full load.

G. Winding Taps:

1. Transformers Less than 15 kVA: Two 5 percent below rated voltage, full capacity taps on primary winding.
2. Transformers 15 kVA and Larger: NEMA ST 20.

H. Sound Levels: NEMA ST 20.

I. Basic Impulse Level: 10 kV.

J. Ground core and coil assembly to enclosure by means of visible flexible copper grounding strap.

K. Mounting:

1. 1-15 kVA: Suitable for wall mounting.
2. 16-75 kVA: Suitable for wall, floor, or trapeze mounting.
3. Larger than 75 kVA: Suitable for floor mounting.

L. Coil Conductors: Continuous copper windings with terminations brazed or welded.

M. Enclosure: NEMA ST 20, Type 1ventilated. Furnish lifting eyes or brackets.

N. Isolate core and coil from enclosure using vibration-absorbing mounts.

O. Nameplate: Include transformer connection data.

2.02 SOURCE QUALITY CONTROL

A. Production test each unit according to NEMA ST20.

PART 3- EXECUTION

3.01 EXAMINATION

A. Verify mounting supports are properly sized and located including concealed bracing in walls.

3.02 EXISTING WORK

A. Disconnect and remove abandoned transformers.

B. Maintain access and adequate ventilation to existing transformers and other installations remaining active and requiring access and ventilation. Modify installation or provide access panel or ventilation grilles.

C. Clean and repair existing transformers to remain or to be reinstalled.

3.03 INSTALLATION

A. Set transformer plumb and level.

B. Use flexible conduit, in accordance with Section 26 05 33, 2 feet minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.

C. Support transformers in accordance with Section 26 05 29.

1. Mount wall-mounted transformers using integral flanges or accessory brackets furnished by manufacturer.
2. Mount floor-mounted transformers on vibration isolating pads suitable for isolating transformer noise from building structure.
3. Mount trapeze-mounted transformers as indicated on Drawings.

D. Provide seismic restraints.

E. Install grounding and bonding in accordance with Section 26 05 26.

3.04 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.2.1.

3.05 ADJUSTING

A. Measure primary and secondary voltages and make appropriate tap adjustments.

END OF SECTION 26 22 00

PART 1- GENERAL

1.01 SUMMARY

A. Section includes branch circuit panelboards.

B. Related Sections:

1. Section 26 05 26 - Grounding and Bonding.
2. Section 26 05 53 - Electrical Identification.

1.02 REFERENCES

A. National Electrical Manufacturers Association:

1. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches.
2. NEMA PB 1 - Panelboards.
3. NEMA PB 1.1 - General Instructions for Proper Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or Less.

B. International Electrical Testing Association:

1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

C. National Fire Protection Association:

1. NFPA 70 - National Electrical Code.

1.03 SUBMITTALS

A. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

B. Product Data: Submit catalog data showing specified features of standard products.

1.04 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of panelboards and record actual circuiting arrangements.

B. Operation and Maintenance Data: Submit spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

PART 2- PRODUCTS

2.01 BRANCH CIRCUIT PANELBOARDS

A. Manufacturers:

1. Cutler Hammer
2. GE Electrical
3. Siemens
4. Square D

B. Product Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard.

C. Panelboard Bus: Copper, current carrying components, ratings as indicated on Drawings. Furnish copper ground bus in each panelboard.

D. Minimum Integrated Short Circuit Rating: 10,000 amperes rms symmetrical for 208 volt panelboards, 22,000 amperes rms symmetrical for 480 volt panelboards, or as indicated on Drawings.

E. Molded Case Circuit Breakers: NEMA AB 1, bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles, listed as Type SWD for lighting circuits, Type HACR for air conditioning equipment circuits, Class A ground fault interrupter circuit breakers as indicated on Drawings. Do not use tandem circuit breakers.

F. Enclosure: NEMA PB 1, Type 1.

G. Cabinet Box: 6 inches deep, 20 inches wide.

H. Cabinet Front: Surface cabinet front with concealed trim clamps, concealed hinge, metal directory frame, and flush lock keyed alike. Finish in manufacturer's standard gray enamel.

PART 3- EXECUTION

3.01 INSTALLATION

A. Install panelboards in accordance with NEMA PB 1.1.

B. Install panelboards plumb.

C. Height: 6 feet to top of panelboard; install panelboards taller than 6 feet with bottom no more than 4 inches above floor.

D. Install filler plates for unused spaces in panelboards.

E. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes to balance phase loads.

F. Install engraved plastic nameplates in accordance with Section 26 05 53.

G. Ground and bond panelboard enclosure according to Section 26 05 26. Connect equipment ground bars of panels in accordance with NFPA 70.

3.02 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform circuit breaker inspections and tests listed in NETA ATS, Section 7.6.

3.03 ADJUSTING

A. Measure steady state load currents at each panelboard feeder; rearrange circuits in panelboard to balance phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.

END OF SECTION 26 24 16

PART 1 GENERAL

1.01 SUMMARY

A. Section includes wall switches; receptacles; and device plates.

B. Related Sections:

1. Section 26 05 33 - Raceway and Boxes: Outlet boxes for wiring devices.

1.02 REFERENCES

A. National Electrical Manufacturers Association:

1. NEMA WD 1 - General Requirements for Wiring Devices.
2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's catalog information showing dimensions, colors, and configurations.

1.04 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 WALL SWITCHES

A. Manufacturers:

1. Cooper Wiring Devices.
2. Hubbell, Inc.
3. Leviton Manufacturing Company.

B. Product Description: NEMA WD 1, General-Duty, AC only general-use snap switch.

C. Body and Handle: Ivory plastic with toggle handle.

D. Indicator Light: Lighted handle type switch; red color handle.

E. Locator Light: Lighted handle type switch; red color handle.

F. Ratings:

1. Voltage: 120-277 volts, AC.
2. Current: 20 amperes.

2.02 RECEPTACLES

A. Manufacturers:

1. Cooper Wiring Devices.
2. Hubbell, Inc.
3. Leviton Manufacturing Company.

B. Product Description: NEMA WD 1, General-duty general use receptacle.

C. Device Body: Ivory plastic.

D. Configuration: NEMA WD 6, type as indicated on Drawings.

E. Convenience Receptacle: Type 5-15.

F. GFCI Receptacle: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.

2.03 WALL PLATES

A. Manufacturers:

1. Cooper Wiring Devices.
2. Hubbell, Inc.
3. Leviton Manufacturing Company.

B. Jumbo Cover Plate: Smooth 302 stainless steel.

C. Weatherproof Cover Plate: Stainless steel plate with hinged and gasketed device cover.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify outlet boxes are installed at proper height.

B. Verify wall openings are neatly cut and completely covered by wall plates.

C. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.02 PREPARATION

A. Clean debris from outlet boxes.

3.03 EXISTING WORK

A. Disconnect and remove abandoned wiring devices.

B. Modify installation to maintain access to existing wiring devices to remain active.

C. Clean and repair existing wiring devices to remain or to be reinstalled.

3.04 INSTALLATION

A. Install devices plumb and level.

B. Install switches with OFF position down.

C. Install receptacles with grounding pole on bottom.

D. Connect wiring device grounding terminal to outlet box with bonding jumper and branch circuit equipment grounding conductor.

E. Install wall plates on flush mounted switches, receptacles, and blank outlets.

F. Connect wiring devices by wrapping solid conductor around screw terminal. Install stranded conductor for branch circuits 10 AWG and smaller. When stranded conductors are used in lieu of solid, use crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under device screws.

G. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

3.05 INTERFACE WITH OTHER PRODUCTS

A. Coordinate locations of outlet boxes provided under Section 26 05 33 to obtain mounting heights as indicated on drawings.

B. Install wall switch 48 inches above finished floor.

C. Install convenience receptacle 18 inches above finished floor.

D. Install convenience receptacle 6 inches above counter.

3.06 FIELD QUALITY CONTROL

A. Inspect each wiring device for defects.

B. Operate each wall switch with circuit energized and verify proper operation.

C. Verify each receptacle device is energized.

D. Test each receptacle device for proper polarity.

E. Test each GFCI receptacle device for proper operation.

3.07 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

3.08 CLEANING

A. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. Section includes interior luminaires, lamps, ballasts, and accessories.

B. Related Sections:

1. Section 26 05 26 - Grounding and Bonding.
2. Section 26 05 33 - Raceway and Boxes.

1.02 REFERENCES

A. American National Standards Institute:

1. ANSI C82.1 - American National Standard for Lamp Ballast-Line Frequency Fluorescent Lamp Ballast.

1.03 SUBMITTALS

A. Shop Drawings: Indicate dimensions and components for each luminaire not standard product of manufacturer.

B. Product Data: Submit dimensions, ratings, and performance data.

1.04 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 INTERIOR LUMINAIRES

A. Product Description: Complete interior luminaire assemblies, with features, options, and accessories as scheduled.

2.02 FLUORESCENT BALLASTS

A. Product Description: Electronic ballast instant start less than 10 percent THD , suitable for lamps specified, with voltage to match luminaire voltage.

2.03 FLUORESCENT LAMPS

A. Manufacturers:

1. General Electric Co.
2. Osram Sylvania
3. Philips

PART 3 EXECUTION

3.01 EXISTING WORK

A. Disconnect and remove abandoned luminaires, lamps, and accessories.

B. Extend existing interior luminaire installations using materials and methods compatible with existing installations, or as specified.

C. Clean and repair existing interior luminaires to remain or to be reinstalled.

3.02 INSTALLATION

A. Install suspended luminaires using pendants supported from swivel hangers. Install pendant length required to suspend luminaire at indicated height.

B. Support luminaires larger than 2 x 4 foot size independent of ceiling framing.

C. Locate recessed ceiling luminaires as indicated on Drawings.

D. Install surface mounted luminaires plumb and adjust to align with building lines and with each other. Secure to prevent movement.

E. Exposed Grid Ceilings: Support surface-mounted luminaires on grid ceiling directly from building structure.

F. Install recessed luminaires to permit removal from below.

G. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.

H. Install clips to secure recessed grid-supported luminaires in place.

I. Install wall-mounted luminaires at height as indicated on Drawings.

J. Install accessories furnished with each luminaire.

K. Connect luminaires to branch circuit outlets provided under Section 26 05 33 using flexible conduit.

L. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

M. Install specified lamps in each luminaire.

N. Ground and bond interior luminaires in accordance with Section 26 05 26.

3.03 FIELD QUALITY CONTROL

A. Operate each luminaire after installation and connection. Inspect for proper

connection and operation.

3.04 CLEANING

A. Remove dirt and debris from enclosures.

B. Clean photometric control surfaces as recommended by manufacturer.

C. Clean finishes and touch up damage.

3.05 PROTECTION OF FINISHED WORK

A. Relamp luminaires having failed lamps at Substantial Completion.

END OF SECTION

SECTION 27 05 14

HORIZONTAL AND BACKBONE CABLING

1.0 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.02 SUMMARY

A. This Section includes fiber optic and copper horizontal and backbone cabling, terminations and patch cables.

B. Provide all horizontal and backbone cabling, terminating hardware, adapters, and cross-connecting hardware and patch panels as necessary to intercnnect the structured cabling system and work area outlets

C. Related Sections Drawings, General Provisions, Special Provisions, Supplementary provisions and Division 1, and 27 Specifications Sections apply to this Section. Work related to this section is described in the following Specifications:

1. 27 05 37 - SPECIAL SYSTEMS CONDUIT AND CABLE TRAY
2. 27 24 01 – VIDEO WALL SYSTEM INFRASTRUCTURE

1.03 REFERENCES

A. The publications listed below form a part of this specification. The publications are referred to in the text by basic designation only.

B. Specific reference in specifications to codes, rules, regulations, standards, manufacturer's instructions, or requirements of regulatory agencies shall mean the latest printed edition of each in effect at the date of contract unless the document is shown dated.

C. Contractor is advised that as all work under this contract will be accomplished at the Hartsfield-Jackson, Atlanta International Airport, the latest version of the City of Atlanta – Department of Information Technology; Communications Infrastructure Standards shall apply to the work to be accomplished.

D. Conflicts:

1. Between referenced requirements: Comply with the one establishing the more stringent requirements.

2. Between referenced requirements and contract documents: Comply with the one establishing the more stringent requirements.

E. References (latest edition of referenced standards):

1. ANSI/TIA/EIA-568-B, Commercial Building Telecommunications Wiring Standards

2. ANSI/TIA/EIA-569-A Commercial Building Standard for Telecommunications Pathways and Spaces

3. ANSI/TIA/EIA-606 Administration Standard for the Telecommunications Infrastructure of Commercial Buildings

4. ANSI/TIA/EIA-526-14A Measurement of Optical Power Loss of Installed Multimode Fiber Cable Plant

5. International Standards Organization/International Electromechanical Commission (ISO/IEC) DIS11801, January 6, 1994

6. Underwriters Laboratories (UL) Cable Certification and Follow Up Program

7. National Electrical Manufacturers Association (NEMA)

8. American Society for Testing Materials (ASTM)

9. National Electrical Code (NEC) 2002

10. National Electrical Safety Code (NESC) 2002

11. Institute of Electrical and Electronic Engineers (IEEE)

12. UL Testing Bulletin

13. Building Industry Consulting Services International (BICSI) Telecommunications Distribution Methods Manual (TDMM)

14. Local, county, state and federal regulations and codes in effect as of date of purchase

15. Equipment of foreign manufacture must meet U.S. codes and standards. It shall be indicated in the proposal the components that may be of foreign manufacture, if any, and the country of origin.

1.04 SUBMITTALS

A. The Contractor shall perform no portion of the work requiring submittal and review of record drawings, shop drawings, product data, or samples until the respective submittal has been approved by the Engineer. Such work shall be in accordance with approved submittals.

B. Qualifications: The Contractor shall submit qualification data sheets for firms and persons as specified in the "Quality Assurance" article of this specification to demonstrate their capabilities and experience.

C. Proposed product data sheets: The Contractor shall submit catalog cutsheets that include manufacturer, trade name, and complete model number for each product specified. Model number shall be handwritten and/or highlighted to indicate exact selection. Identify applicable specification section reference for each product.

D. Samples: The Contractor shall provide one sample of each type of the following cables for approval:

1. Multimode fiber optic breakout cable with connectors attached to each end.

2. Category 6 cable with connectors attached to each end.

E. Cable Testing Plan: The Contractor shall provide a test plan for media testing as described in the article "Field Quality Control" prior to beginning cable testing. The following minimal items shall be submitted for review:

1. All testing methods

2. Product data for test equipment

3. Certifications and qualifications of all persons conducting the testing

4. Calibration certificates indicating that equipment calibration meets National Institute of Standards and Technology (NIST) standards and has been calibrated at least once in the previous calendar year

5. Examples of test reports, including all graphs, tables, and charts necessary for display of testing results

F. Cable Testing Reports: The Contractor shall submit cable test reports as follows:

1. Submit certification test reports of Contractor-performed tests in accordance with the "Field Quality Control" article of this document.

2. The tests shall clearly demonstrate that the media and its components fully comply with the requirements specified herein.

3. Electronic and hardcopy versions of test reports shall be submitted together and clearly identified with cable identification.

4. Cable inventory data shall be submitted for all fiber, copper, and coaxial cabling and termination equipment. Submit data electronically on CD-ROM in Microsoft Excel format, listing products furnished, including:

a. Manufacturer's name

b. Manufacturer's part numbers

c. Cable numbers utilizing the DOA's cable numbering standard

d. Location and riser assignments

G. Record Drawings: Furnish CAD drawings of completed work including cable ID numbers following the DOA's labeling standards.

1.05 QUALITY ASSURANCE

A. Contractor Qualifications. Submit written proof that the following experience requirements are being met.

1. All work shall be supervised on-site by a BICSI Registered Communications Distribution Designer (RCDD). Must demonstrate knowledge and compliance with all BICSI, TIA/EIA, UL, and NEC standards and codes. Contractor shall submit proof of RCDD designation.

2. The Contractor shall be certified by the manufacturer of the products, adhere to the manufacturer's engineering, installation and testing procedures and utilize the authorized manufacturer components and distribution channels in provisioning this Project.

3. All members of the installation team shall be certified by the manufacturer as having completed the necessary training to complete their part of the installation, including installation. Resumes of the entire team shall be provided along with documentation of completed training courses.

4. The Contractor shall provide five references for projects of equivalent scope, type and complexity of work completed within the last five years.

B. Materials and equipment: Materials shall be rated for continuous operation under the ambient environmental temperature, humidity, and vibration conditions encountered at the installed location. The materials shall meet the following requirements:

1. Interior controlled environment: 60 to 100 degrees F dry bulb and 20 to 90 percent relative humidity, non-condensing.

2. Interior uncontrolled environment: 0 to 130 degrees F dry bulb and 10 to 95 percent relative humidity, non-condensing.

3. Exterior environments: Minus 30 degrees to 130 degrees F dry bulb, and 10 to 100 percent relative humidity, condensing.

4. Hazardous environment: All system components located in areas where fire or explosion hazards may exist because of flammable gas or vapors, flammable liquids, combustible dust, or ignitable fibers or flyings, shall be rated and installed according to Chapter 5 of the NEC and as shown.

5. Listing and Labeling: Provide products specified in this Section that are listed and labeled, as defined in the NEC Article 100.

C. Standard products:

1. Equipment and materials shall be standard products of a manufacturer regularly engaged in the manufacture of structured cabling products and shall be the manufacturer's latest standard design.

2. Equipment and materials must conform to DOA cabling standards and current DOA approved equipment and materials.

3. Items of the same classification shall be identical. This requirement includes equipment, modules, assemblies, parts, and components.

4. Single Point of Contact Responsibility: All cable and components of each kind shall be covered by a single warranty program with a single point of contact. For fiber optic and Category 5 and 6 UTP cable, cable and connecting hardware shall be manufactured by the same company or be part of the same cabling system, i.e. warranted by the manufacturer(s) as one cabling system.

1.06 WARRANTY

A. The Contractor shall provide a joint written warranty of the manufacturer(s) and the installer(s), on a single document. The document shall warrant complete installation of the equipment, system, and software to be free from defects in materials and workmanship for a period of no less than 20 years for Category 6 copper and 25 years for fiber, starting with the date of Final System Acceptance.

B. Contractor shall warrant that all approved cabling components meet or exceed the specifications provided in the product data submittal and exceed ANSI/TIA/EIA-568-B and ISO/IEC 11801 for the warranty period. The warranty shall apply to all passive SCS components.

C. Copper horizontal distribution media components, including cabling, jacks and connecting hardware, shall carry warranty to meet Category 6 performance

standards as defined in ANSI/TIA/EIA-568-B series of standards and addenda and in manufacturer specifications.

D. Fiber optic multimode horizontal distribution media components, including cabling, connectors, splices, and jacks, shall carry warranty to meet applicable transmission performance requirements of the ANSI/TIA/EIA-568-B series of standards and addenda and in manufacturer specifications.

E. The Contractor shall warrant that the proposed merchandise will conform to its description and any applicable specifications, and shall be of good quality for the known purpose for which it is intended.

F. The product warranty shall cover the replacement or repair of defective products and labor for the replacement or repair of such defective products.

1.07 MAINTENANCE AND SUPPORT

A. System Assurance: The System Assurance shall cover the failure of the structured cabling system to support the application which it was designed to support, as well as additional application(s) introduced in the future by recognized standards or user forums that use the ANSI/TIA/EIA-568-B or ISO/IEC 11801 component and link/channel specifications for cabling, for the warranty period.

B. System Certification: Upon successful completion of the installation and subsequent inspection, the DOA shall be provided with a numbered certificate, from the manufacturing company, registering the installation.

C. Support Availability: The Contractor shall commit to make available local support for the product and system during the Warranty period.

1.08 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions in areas of installation by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating units without field measurements. Coordinate supports, adjacent construction, and fixture locations to ensure actual dimensions correspond to established dimensions.

C. Maintain temperature of between 64 degrees F and 75 degrees F and between 30 and 55 percent humidity in areas of voice and data system work.

1.09 DELIVERY AND STORAGE

A. Equipment shall be delivered in original packages with labels intact and identification clearly marked.

B. Equipment shall not be damaged in any way and shall comply with manufacturer's operating specifications.

C. Equipment and components shall be protected from the weather, humidity, temperature variations, dirt, dust, or other contaminants. Equipment damaged prior to system acceptance shall be replaced at no cost to the DOA.

1.10 COORDINATION

A. Coordinate installation with other trades and furniture installers.

B. Coordinate with all contractors providing equipment outside the scope of this contract.

2.0 PRODUCTS

2.01 MANUFACTURERS

A. All DOA communication solutions shall be comprised of the following:

1. Panduit 6 (or above) copper data/voice solution, including termination panels, outlets patch cables and connectors, no equal.

2. Fiber Optic Cable, including termination panels, outlets, patch cables and connectors; Corning LANscape fiber optic solution, no equal.

B. Identification (Labeling) System

1. Brady

2. Dymo

3. Panduit

2.02 FIBER OPTIC GENERAL REQUIREMENTS

A. Manufactured by Corning.

B. Fiber optic cable shall be certified to meet all parts of TIA/EIA-455 and comply with TIA/EIA-492, ISO/IEC 11801, ANSI/ICEA S-83-596 and ANSI/ICEA S-83-640 and the NEC.

C. Fibers shall have D-LUX coating or approved equivalent to ensure color retention, minimize microbending losses and improve handling. The coating shall be mechanically strippable.

D. Cable installed in plenums or air-handling spaces shall meet UL 910 and shall be marked OFNP (optical fiber non-conductive plenum) in accordance with the NEC.

E. Plenum-rated cable consisting of multiple fibers shall have a Plenum PVC outer jacket. Each group of fibers shall have a color-coded Low Smoke PVC buffer. The buffered fibers are organized in subunits of fibers, reinforced with aramid yarn for extra strength and surrounded with a color-coded low smoke tube.

F. No cabling shall be placed in plenum without written permission from the DOA.

G. Riser cable shall meet UL 1666 and be marked OFNR (optical fiber non-conductive riser) in accordance with the NEC. Non-plenum, riser rated cable consisting of multiple fibers, shall have an orange, Polyvinyl Chloride (PVC) outer jacket. All fiber optic cable not encased in conduit must be armor-jacketed with proper outer covering.

H. Fiber optics conductors shall follow standard color code schemes. Fiber numbers and binders shall correspond to the color codes as follows:

1. Fiber/Binder No. 1 – blue

2. Fiber/Binder No. 2 – orange

3. Fiber/Binder No. 3 – green

4. Fiber/Binder No. 4 – brown

5. Fiber/Binder No. 5 – slate

6. Fiber/Binder No. 6 – white

7. Fiber/Binder No. 7 – Red

8. Fiber/Binder No. 8 – Black

9. Fiber/Binder No. 9 – Yellow

10. Fiber/Binder No. 10 – Violet

11. Fiber/Binder No. 11 – Rose

12. Fiber/Binder No. 12 – Aqua

I. The fiber optic cable shall be shipped on reels in lengths as specified with a minimum overage of 10 percent.

J. The cable shall be wound on the reel so that unwinding can be done without kinking the cable.

K. Two meters of cable at both ends of the cable shall be accessible for testing.

L. Marking: Each reel shall have a permanent label attached showing length, cable identification number, cable size, cable type, attenuation, bandwidth, and date of manufacture. Labels shall be water resistant and the writing on the labels shall be indelible.

M. Cable Minimum Bending Radius

1. During Installation: 20 times cable diameter

2. After Installation: 10 times cable diameter

N. Operating Range: -76°F to 185°F (-60°C to 85°C)

O. Storage Temperature Range: -40°F to 149°F (-40°C to 65°C)

P. All fiber optic cable not encased in conduit must be armor-jacketed with proper outer covering.

2.03 MULTIMODE FIBER REQUIREMENTS

A. Manufactured by Corning.

B. Multimode fiber shall meet the requirements of EIA/TIA-492AAAC, "Detail Specification for 850-nm Laser-Optimized, 50 micron Core Diameter/125 micron Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers."

C. Fibers shall have dual wavelength capability; transmitting at 850 and 1300 nm ranges.

D. Laser optimized 50 micron ± 2.5 micron core

E. Core non-circularity: ≤ 5%

F. 125 micron ± 2 micron cladding diameter

G. Cladding non-circularity: ≤ 1%

H. Colored fiber diameter: 254 micron ± 5 micron

I. Minimum tensile strength: 100,000 psi

J. Maximum Attenuation: 3.5 dB/km at 850 nm and 1.0 dB/km at 1300 nm

K. Minimum Bandwidth: 2000 MHz at 850 nm and 500 MHz at 1300 nm

2.04 SINGLE MODE FIBER REQUIREMENTS

A. Manufactured by Corning.

B. Single-mode fiber shall meet EIA/TIA-492CAAB, "Detail Specification for Class Iva Dispersion-Un-shifted Single-Mode Optical Fibers with Low Water Peak,", ITU recommendation G.652, “Characteristics of a single-mode optical fiber cable,” and IEC 60793-2-50 Type B1.3.

C. Fibers shall have dual wavelength capability; transmitting at 1310 and 1550 m ranges.

D. Laser optimized 8.3 micron core

E. 125 micron ± .7 micron cladding diameter

F. Cladding non-circularity: ≤ .7%

G. Colored fiber diameter: 254 micron ± 5 micron

H. Minimum tensile strength: 100,000 psi

I. Maximum Attenuation: .40 dB/km at 850 nm and 1.0 dB/km at 1300 nm

J. Minimum Bandwidth: 20 GHz

2.05 CATEGORY 6 CABLE REQUIREMENTS: HIGH PERFORMANCE CATEGORY 6 UTP SHALL ADHERE TO THE FOLLOWING:

A. Manufactured by General Cable or approved Panduit cabling partner.

B. Jacket Color Coding shall be in accordnace with DIT;

1. Data: White

2. Voice: Blue

3. MUFIDS: Orange (MUFIDS cables shall be CATEGORY 5, coordinate with MUFIDS supplier

4. ACS: Red

5. CCTV: Yellow

C. 23 AWG Solid Bare Copper

D. Cable jacket shall comply with NEC Article 800 for use as a plenum cable and shall be UL and c (UL) Listed Type CMP (communications multipurpose plenum).

E. Cable shall terminate on an eight-pin modular jack at each outlet. All horizontal cabling shall meet or exceed the ANSI/EIA/TIA-568-B.2 Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted Pair Cabling Components.

F. Cables shall be marked as UL verified with a minimum of Category 6 rating.

G. The cable shall support Voice, Analog Baseband Video/Audio, Fax, Modem, Switched-56, T-1, ISDN, RS-232, RS-422, RS-485, 10BASE-T Ethernet, Token Ring, 100Mbps TP-PMD, 100BASE-T Ethernet, 155 Mbps ATM, AES/EBU Digital Audio, 270 Mbps Digital Video, 622 Mbps 64-CAP ATM and emerging high-bandwidth applications, including 1 Gbps Ethernet, gigabit ATM, as well as all 77 channels (550 MHz) of analog broadband video.

H. The maximum horizontal cable length for Category 6 copper cable from the termination of the cable in the communications room to the outlet is 295 feet.

I. Cable shall meet or exceed the following electrical characteristics:

1. Mutual capacitance: 47.8 nF/m

2. Characteristic impedance: (± 3%) of 100 Ohms 1-550 MHz

3. DC resistance maximum: 9.83 Ohms/100m

4. Positive ACR: Out to 395 MHz-km

5. Cable shall be specified to 550 MHz and shall meet the guaranteed electrical performance and physical specifications as follows:

Freq (MHz)	Attn dB/100m	NEXT (dB)	PS NEXT (dB)	ELFEXT (dB)	PS ELFEXT	Return Loss
0.772	1.6	76.0	74.0	70.0	67.0	‡
1	1.8	74.3	72.3	67.8	64.8	20
4	3.6	65.3	63.3	55.7	52.7	23
8	5.1	60.8	58.8	49.7	46.7	24.5
10	5.8	59.3	57.3	47.8	44.8	25
16	7.3	56.3	54.3	43.7	40.7	25
20	8.2	54.8	52.8	41.7	38.7	25
25	9.2	53.3	51.3	39.8	36.8	24
31.25	10.4	51.9	49.9	37.9	34.9	24
62.5	15.0	47.4	45.4	31.8	28.8	22

Freq (MHz)	Attn dB/100m	NEXT (dB)	PS NEXT (dB)	ELFEXT (dB)	PS ELFEXT	Return Loss
100	19.3	44.3	42.3	27.8	24.8	20
200	28.3	39.8	37.8	21.7	18.7	18
250	32.1	38.3	36.3	19.8	16.8	17
300	35.6	37.2	35.2	18.2	15.2	17
350	38.9	36.2	34.2	16.9	13.9	16
400	42.0	35.3	33.3	15.7	12.7	16
450	45.0	34.5	32.5	14.7	11.7	16
500	47.9	33.8	31.8	13.8	10.8	15
550	50.6	33.2	31.2	12.9	9.9	15
‡ Not Specified						

Figure 1 - Cable Requirements

2.06 TERMINATION HARDWARE

A. Fiber Interconnect Units and Distribution Shelves

1. Corning Pretium 4-rack unit connector housing

2. Modular in design; used in fiber optic interconnection, cross-connection, and splicing applications

3. 19-inch rack-mountable

4. Accept 12, 24, 48, 72 or 144-strand terminations, as shown on communications drawings.

5. Duplex SC and/or LC connectors, depending on connection needs, coordinate with DIT.

6. All fiber connections shall be fusion spliced Corning low profile SC connector modules with three-meter pigtails.

B. Category 6 copper patch panels

1. Horizontal copper cables shall be terminated in eight position/eight conductor (8P8C) Panduit Minicom angled modular faceplate patch panels with green jacks.

2. The termination block on the patch panel shall support the appropriate Category 6 applications, including 100 Base-T, 52/155 Mbps ATM, and 1000 BASE-T Gigabit Ethernet, and facilitate cross connection and inter connection using modular patch cords.

3. All Modular jack panels shall be wired to T568B.

4. The wiring block shall accommodate 23 AWG cable conductors.

5. All modular cross connect panels shall be UL listed.

C. Category 6 work area outlets

1. 8P8C non-keyed modular outlets for applications up to one Gbps and ANSI/TIA/EIA-568-B compliant for Category 6 transmission requirements

2. Horizontal copper cables shall be terminated in eight position/eight conductor (8P8C) Panduit Minicom angled modular faceplate patch panels with green jacks.

3. Part of the UL LAN Certification and Follow-up Program

4. T568B eight-position jack pin/pair assignments

5. Data outlets shall be green in color for non-DOA network; orange for DOA network.

6. Voice outlets shall be ivory.

D. Wall Outlet Faceplates

1. Panduit Minicom Classic Series Sloped Faceplates

2. White or ivory to match electrical outlets

3. Two, Four or six-position with blanks inserted in unused ports

2.07 PATCH CABLES

A. General: all patch cables shall be factory assembled. Field-assembled patch cords are not acceptable.

B. Multimode Fiber Patch Cables: Patch cables shall meet the following specifications:

1. Buffered, graded-index fiber with a 50 micron core and a 125 micron cladding.

2. The fiber cladding shall be covered by aramid yarn and a jacket of flame-retardant PVC.

3. Duplex SC and/or LC connectors, depending on connection needs

4. ISO 9001 Certified Manufacturer

5. Operating temperature: -4° to 158° F (-20 to 70° C)

6. Cable Retention: 50 lb. (220 N) minimum

7. Mated Connector Loss: $\mu = 0.3$ dB, $\sigma = 0.2$ dB

8. Connection Repeatability: 0.20 dB maximum change per 100 reconnects

C. Category 6 Patch Cords

1. Provide a Category 6 Modular Patch Cord for each installed port. Patch cords shall be green in color.

2. All cords shall conform to the Category 6 requirements of ANSI/TIA/EIA-568-B.2 Commercial Building Telecommunications Cabling Standard, Horizontal Cabling Section, and be part of the UL LAN Certification and Follow-up Program.

3. Cords shall be equipped with an eight-pin modular connector on each end and shall be of appropriate length for application.

4. Where applicable (only when connecting voice outlets to copper riser), provide hybrid patch cords. Cords shall be one-pair stranded D8PS (RJ45) connector on one end and 110GS on the other end and shall be of appropriate length for application.

5. All Category 6 cordage shall be round, and consist of 23 AWG copper, stranded conductors, tightly twisted into individual pairs.

6. Maximum equipment cable length from the work area outlet to the device should be limited to 10 feet. Maximum cable length for jumpers and patch cords in the communications room should be limited to 20 feet.

2.08 IDENTIFICATION (LABELING) SYSTEM

1. Labeling system shall consist of a hand-held portable printer.

2. All labels shall be permanent, i.e. will not fade, peel, or deteriorate due to environment or time.

3. A general purpose label designed for powdered coated surfaces a minimum of one-inch in height shall be used on racks and cabinets.

4. Handwritten labels are not acceptable.

3.0 EXECUTION

3.01 EXAMINATION

A. Verify conduits, cable trays and pull boxes are properly installed.

B. Verify backboards are properly installed.

C. Verify telecommunications grounding system is properly installed and tested.

D. Verify liquid-carrying pipes are not installed in or above voice and data system communications rooms. Do not proceed with installation in affected areas until removed.

E. Verify that no horizontal copper cable run is greater than 295 feet from the outlet, through the provided pathway, to the communications room termination panel, including slack and service loops.

3.02 INSTALLATION

A. Install work following drawings, manufacturer's instructions and approved submittal data.

B. All installation shall be done in conformance with ANSI/TIA/EIA-568-B standards, BICSI methods, industry standards and manufacturers' installation guidelines. The Contractor shall ensure that the maximum pulling tensions of the specified distribution cables are not exceeded and cable bends maintain the proper radius during the placement of the facilities. Failure to follow the appropriate guidelines shall require the Contractor to provide in a timely fashion the additional material and labor necessary to properly rectify the situation. This shall also apply to any and all damages sustained to the cables by the Contractor during the implementation.

C. The Contractor shall provide a 10-foot service loop at the communications room and shall provide a three-foot service loop above the access ceiling or cable trays unless specified otherwise. This allows for future changes or expansion without installing new cables.

D. Identification

1. Label cable terminations on designation strips.

2. Label all cable, including patch cables, at each terminating point.

3. Label each port of the work area outlet to correspond with telecom patch panel.

4. Labels shall be self-adhesive and machine generated. Handwritten labels are not acceptable.

5. Cable identification numbers shall not be duplicated.

6. Labeling convention to be coordinated with DIT.

E. Documentation

1. All cable inventory data documentation shall be submitted in format coordinated with and approved by DIT so that data can be incorporated into existing databases.

2. Documentation shall include cable identification number, source and destination, type of cable, length of cable and number of pairs or fibers.

3. Complete cross connect documentation is required. It shall include detailed documentation of each pair of all horizontal cable.

3.03 FIELD QUALITY CONTROL

A. Post-Installation Testing

1. Contractor shall test each Category 6 cable and each fiber strand of every optical fiber cable prior to acceptance.

2. Contractor shall supply all of the required test equipment used to conduct acceptance tests.

3. Contractor shall submit acceptance documentation as defined below. No cabling installation is considered complete until test results have been completed, submitted and approved.

B. Standards Compliance and Test Criteria

1. Category 6 Copper Backbone Cabling shall meet or exceed ANSI/TIA/EIA-568-B.2 Category 6 Horizontal Cabling requirements and meet the manufacturer’s specifications for the installed product.

2. Fiber optic cable shall meet or exceed ANSI/TIA/EIA-568-B.3 Optical Fiber Cabling Components Standard requirements and meet the manufacturer’s specifications for the installed product.

C. Cable Test Documentation

1. Cable test documentation shall be submitted in hard copy and electronic (CD-ROM) formats. If proprietary software is used, CD shall contain any necessary software application required to view test results. If the results are delivered in a standard format like Excel, Access, CSV files, etc., software to read these files is not required. Electronic reports shall be accompanied by a Certificate signed by an authorized representative of the Contractor warranting the truth and accuracy of the electronic report. Certificate shall reference traceable circuit numbers that match the electronic record.

2. The following reports shall be submitted. Any individual test that fails the relevant performance specification shall be marked as FAILED.

   a. Certification test report for Category 6 cable

   b. Certification test report for Fiber Optic cable

   c. OTDR and power meter test report for Fiber Optic cable

D. Cable Test Equipment

1. Test equipment used under this contract shall be from manufacturers that have a minimum of 5 years experience in producing field test equipment. Manufacturers shall be ISO 9001 certified.

2. Test equipment for Category 6 UTP shall be UL verified to meet Level III accuracy as specified in ANSI/TIA/EIA-568-B.2-1. The cable installers shall have a copy of this reference in their possession and be familiar with the contents.

3. Test equipment for multimode fiber cabling shall meet the requirements of ANSI/TIA/EIA-526-14-A. The light source shall meet the launch requirements of ANSI/TIA/EIA-455-50B, Method A. The cable installers shall have a copy of these references in their possession and be familiar with the contents.

4. The test instrument shall be within the calibration period recommended by the manufacturer.

5. Test instruments shall have the latest software and firmware installed.

6. All test tools of a given type shall be from the same manufacturer, and have compatible electronic results output.

7. Test adapter cables shall be approved by the manufacturer of the test equipment. Adapters from other sources are not acceptable.

3.04 CLEANING

A. Remove all unnecessary tools and equipment, unused materials, packing materials, and debris from each area where Work has been completed unless designated for storage.

3.05 ACCEPTANCE

A. Once all work has been completed, test documentation has been submitted and approved, and the DOA is satisfied that all work has been completed in accordance with contract documents, the DOA will notify Contractor in writing of formal acceptance of the system.

B. Acceptance shall be subject to completion of all work, successful post-installation testing which yields 100 percent PASS rating, and submittal and approval of full documentation as described above.

END OF SECTION

SECTION 27 05 37

SPECIAL SYSTEMS CONDUIT AND CABLE TRAY

1.0 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings, General Provisions, Special Provisions, Supplementary provisions and Division 1, and 27 Specifications Sections apply to this Section. Work related to this section is described in the following Specifications:

1. 27 05 14 – HORIZONTAL and BACKBONE CABLE CABLING
2. 27 24 01 – VIDEO WALL SYSTEM INFRASTRUCTURE

1.02 SUMMARY

A. This Section includes the following:

1. Conduit, fittings and bodies
2. Riser flexible raceway (innerduct) and fittings
3. Junction boxes, pull boxes and gutters
4. Measured pull tape
5. Identification and labeling.
6. Cable Tray and associated accessories and fittings
7. Communications System Ladder Rack and associated accessories and fittings
8. Open-top cable supports (J-hooks) and supports for communications systems
9. Fire Stop Products

1.03 REFERENCES

A. The publications listed below form a part of this specification. The publications are referred to in the text by basic designation only.

B. Specific reference in specifications to codes, rules, regulations, standards, manufacturer's instructions, or requirements of regulatory agencies shall mean the latest

printed edition of each in effect at the date of contract unless the document is shown dated.

C. Contractor is advised that as all work under this contract will be accomplished at the Hartsfield-Jackson, Atlanta International Airport, the latest version of the City of Atlanta – Department of Information Technology; Communications Infrastructure Standards shall apply to the work to be accomplished.

D. Conflicts:

1. Between referenced requirements: Comply with the one establishing the more stringent requirements.

2. Between referenced requirements and contract documents: Comply with the one establishing the more stringent requirements.

E. References:

1. American National Standards Institute (ANSI):

   a. C80.1 Rigid Steel Conduit - Zinc Coated

   b. C80.4 Fittings for Rigid Metal Conduit

2. Federal Specifications (FS):

   a. W-C-58C Conduit Outlet Boxes, Bodies Aluminum and Malleable Iron

   b. W-C-1094 Conduit and Conduit Fittings Plastic, Rigid

   c. WW-C-566C Flexible Metal Conduit

   d. WW-C-581D Coatings on Steel Conduit

3. National Electrical Manufacturers Association (NEMA):

   a. NEMA VE 1 – Metal Cable Tray Systems

   b. NEMA VE 2 – Metal Cable Tray Installation Guidelines

4. American Society for Testing and Materials (ASTM)

   a. ASTM A123 – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

   b. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

   c. ASTM B633 – Standard Specification for Electrodeposited Coatings of

Zinc on Iron and Steel

5. Underwriters Laboratories (UL):

   a. 6 Rigid Metal Electrical Conduit

   b. 514 B Fittings for Conduit and Outlet Boxes

   c. 1666 Standard for Riser Application for Optical Fiber Raceway.

6. National Fire Protection Association (NFPA) ANSI/NFPA 70 National Electrical Code (NEC)

7. Telecommunications Industry Association/Electronic Industries Alliance ANSI/TIA/EIA-569-A Commercial Building Standard for Telecommunications Pathways and Spaces

8. Building Industry Consulting Services International (BICSI) Telecommunications Distribution Methods Manual (TDMM)

9. Local, county, state and federal regulations and codes in effect as of date of purchase

10. Equipment of foreign manufacture must meet U.S. codes and standards. It shall be indicated in the proposal the components that may be of foreign manufacture, if any, and the country of origin.

1.04 SUBMITTALS

A. Qualifications: Demonstrate compliance with requirements of Paragraph 1.05 below.

B. Product Data: Include part numbers, cut sheets and detailed descriptions, for all proposed equipment.

C. Record Drawings: Furnish CAD drawings of completed work including cable ID numbers following the DOA's labeling standards.

1.05 QUALITY ASSURANCE

A. Contractor Qualifications. Submit written proof that the following experience requirements are being met.

1. The Contractor shall submit references and other related evidence of installation experience for a period of three years prior to the issue date of this Specification.

2. All work shall be supervised on-site by a BICSI Registered Communications Distribution Designer (RCDD). Must demonstrate

knowledge and compliance with all BICSI, TIA/EIA, UL, and NEC standards and codes. Contractor shall submit proof of RCDD designation.

B. Provided products shall meet the following requirements: Items of the same classification shall be identical. This requirement includes equipment, assemblies, parts, and components.

C. Assure that the "as installed" system is correctly and completely documented including engineering drawings, manuals, and operational procedures in such a manner as to support maintenance and future expansion of the system.

1.06 COORDINATION

A. Field coordinate installation of conduit, cable tray and J-hooks with other trades to ensure clearance requirements are met.

1.07 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive DOA of other rights DOA may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

1.08 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions in areas of installation by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating units without field measurements. Coordinate supports, adjacent construction, and fixture locations to ensure actual dimensions correspond to established dimensions.

1.09 DELIVERY AND STORAGE

A. Equipment shall be delivered in original packages with labels intact and identification clearly marked.

B. Equipment shall not be damaged in any way and shall comply with manufacturer’s operating specifications.

C. Equipment and components shall be protected from the weather, humidity, temperature variations, dirt, dust, or other contaminants. Equipment damaged prior to system acceptance shall be replaced at no cost to the DOA.

2.0 PRODUCTS

2.01 MANUFACTURERS

A. Subject to compliance with requirements, manufacturers that may be incorporated in the work, include, but are not limited to the following:

B. Rigid Steel Conduit:

1. Allied Tube and Conduit
2. Wheatland Tube Company
3. Triangle Wire and Cable, Inc.

C. Electrical Metallic Tubing (EMT) Conduit:

1. Allied Tube and Conduit
2. Wheatland Tube Company
3. Triangle Wire and Cable, Inc.

D. Conduit Fittings and Bodies:

1. Crouse-Hinds, Appleton Electric
2. Killark Electric Manufacturing Company
3. O-Z/Gedney.

E. Nema Enclosures and Junciton Boxes

1. Hoffman
2. Cooper
3. Hubble
4. Wiegman

F. Innerduct: Carlon Riser Gard Flexible Raceway (corrugated)

G. Measured pull tape – pull tape printed with sequential footage markings for accurate measurements:

1. Fibertek

2. Condux International

H. Cable tray and Black Ladder Runway/ Rack

1. Chatsworth Products Inc

2. Thomas & Betts

3. GS Metals Corp.

4. MP Husky Corp.

5. Cooper B-Line

I. J-Hooks (where approved for use)

1. Copper B-Line, Inc.

2. Erico

J. Identification (Labeling) System

1. Brady

2. Dymo

K. Fire Stop Prodcuts

1. Cooper B- Line

2. 3M

2.02 MATERIALS

A. All conduits, fittings, junction and pull boxes shall be UL rated.

B. All conduits, fittings, junction and pull boxes shall comply with the NEC.

C. Rigid Steel Galvanized Conduit and Fittings Before Coating

1. Follow FS WW-C-581d, ANSI C80.1, and UL 6.

2. Pass bending, ductility, and thickness of zinc coating in ANSI C80.1.

D. Electrical Metallic Tubing (EMT):

1. EMT fittings shall be formed steel compression ring type. Die cast fittings are not allowed.

2. EMT shall be UL listed and conform to NEC Article 300.22.

3. Shall be used inside buildings only.

4. Only manufacturer's fittings, transition adapters, terminators and fixed bends shall be used.

5. All transition junction and pull boxes, fittings terminators and adapters shall be a metallic material.

E. Conduit Bodies: Follow UL 514B and FS W-C-58C. Furnish sufficient coating for touch up after installation.

F. Conduit Fittings

1. All fittings shall be compression or threaded.

2. Fittings shall provide a secure connection for pulling communications cables.

3. Setscrew fittings are not permitted.

G. Conduit "condulets" are not permitted.

H. Innerduct:

1. All fiber shall be installed in innerduct.

2. One part segmented

3. UL Listed with Flame Propagation compliant with UL 2024

4. Only manufacturer's fittings, transition adapters, terminators and fixed bends shall be used.

5. 1 ¼ -inch corrugated, non-metallic

I. Measured Pull Tape

1. Pre-lubricated, woven polyester, low friction, and high abrasion resistant yarn

2. Minimum average tensile strength shall be 1130 lbs. for 1½-inch and

smaller conduits and innerduct.

3. Minimum average tensile strength shall be 1800 lbs. for conduits larger than 1½ inch.

J. Pull Boxes, Junction Boxes, Enclosures, and Gutters

1. All junction boxes, gutters and pull boxes shall comply with NEC Article 314.

2. All junction boxes, Enclosures, gutters and pull boxes shall meet the following minimum material requirements:

   a. 16-gauge steel or heavier

   b. Seams shall be continuously welded and grounded smooth.

   c. External screws and clamps

   d. External mounting feet (where possible)

   e. Oil-resistant gasket and adhesive

   f. ANSI 61 gray polyester powder coating inside and out over phosphatized surface

   g. UL 50 type 12.

3. All junction boxes, Enclosures, gutters and pull boxes shall be provided with bushings for conduits and/or cabling as required.

4. All junction boxes, Enclosures, gutters and pull boxes shall be securely installed.

5. All junction boxes, Enclosures, gutters and pull box sizes for single and multiple conduit runs shall comply with BICSI TDMM.

K. Cable Tray

1. 12” wide (minimum size) Aluminum ladder tray. All fabricated parts shall be made from Aluminum.
2. Ladder type trays shall consist of two longitudinal members (side rails) with transverse members (rungs) welded to the side rails.
3. Rungs shall be spaced nine inches on center. Spacing in radiused fittings shall be nine inches and measured at the center of the tray's width.
4. Rungs shall have a minimum cable-bearing surface of 7/8 inch with radius edges.
5. No portion of the rungs shall protrude below the bottom plane of the side rails.

6. Each rung must be capable of supporting the maximum cable load, with a safety factor of 1.5 and a 200 pound concentrated load when tested in accordance with NEMA VE-1, section 5.4.
7. Cable trays shall have sufficient depth and width so as not to exceed 50 percent fill ratio, including anticipated growth.
8. Straight tray sections shall have side rails fabricated as I-Beams. All straight sections shall be supplied in standard eight-foot lengths, except where shorter lengths are permitted to facilitate tray assembly lengths.

L. Black Ladder Rack

1. Used in the IDF and telecom rooms as shown on communication system drawings to support the horizontal, Vertical and other communication cables.
2. Provide and install all straight sections, vertical and horizontal, 90° bends. T- and cross sections, and all accessories as shown on the Contract Documents. Additionally, provide and install all necessary hardware to allow a seamless transition between the outside and the inside of the telecommunication rooms. (including fire stop sections)

    a. Steel construction
    b. Color: black
    c. Tray Width: 18”
    d. CPI Part Number: 10250-718

3. Provide and install all straight sections, vertical and horizontal, 90° bends.T- and cross section

4. Threaded Rod and Covers.
    a. 12” threaded rod covers for each piece of threaded rod that supports the ladder rack.
    b. CPI part number : 11085-001

5. Provide and install ladder rack runway cable radius drops

    a. Must provide one at every location where cabling is routed through the rungs to help maintain proper bend radius.
    b. Color: black
    c. Radius drop width: 18”
    d. CPI part number 12100-718

6. Provide and install Cable retaining post on ladder racks

    a. Retaining post must be mounted every 2 feet along the ladder rack
    b. Height: 8”
    c. Color: black

d. CPI part number 10596-708

7. Ladder Rack Kit

a. Provide and install one ground Kit for each equipment rack in the TRs.
b. CPI part number 12061-001.

8. Grounding Kit

a. Provide and install one ground Kit for each equipment rack, and ladder rack / Tray segment

9. Splice Kits

a. Butt Splice Kit: CPI part number: 11301-701
b. Junction Splice Kit: CPI part number: 11302-701
c. End Closing Kit: CPI part number: 11700-718

10. 18” Triangular Wall Brackets

a. CPI part number: 11312-718

11. 18” Wall Angle Kit

a. a. CPI part number: 11421-718

12. Re-usable Tie Wraps

a. Used in all locations within the IDF and Telecom Rooms to tie the horizontal, riser and inter-connect cable bundles entering the equipment racks.
b. Furnish Black Ortronics Velcro Ties.

M. J-hooks **In general, J-hooks shall not be used unless specifically authorized by the Engineer with authorization from DIT. When and if used;**

1. Cable hooks shall have a flat bottom and provide a minimum of 1-5/8 inch cable bearing surface.

2. Cable hooks shall have 90-degree radiused edges to prevent damage while installing cables.

3. Cable hooks shall be designed so the mounting hardware is recessed to prevent cable damage.

4. Cable hooks shall have a stainless steel cable latch retainer to provide containment of cables within the hook. The retainer shall be removable and reusable.

5. Cable hooks shall be factory assembled for direct attachment to walls, hanger rods, beam flanges, purlins, strut, floor posts, etc. to meet job conditions.

6. Factory assembled multi-tiered cable hooks shall be used where required to provide separate cabling compartments, or where additional capacity is needed.

7. Finishes

   a. Cable hooks for non-corrosive areas shall be pre-galvanized steel, ASTM A653. Where additional strength is required, cable hooks shall be spring steel with a zinc-plated finish, ASTM B633, SC3.

   b. Cable hooks for corrosive areas shall be stainless steel, AISI Type 304.

N. Labels and Labeling System

1. Labeling system shall consist of a hand-held portable printer.

2. Conduits: General-purpose label designed for powdered coated surfaces with an ultra-aggressive adhesive. Label size shall be appropriate for the conduit size. Font size shall be easily visible from the finished floor.

3. Innerduct: Polyethylene general-purpose tagging material attached using tie wraps.

4. Junction boxes: General-purpose label designed for powdered coated surfaces with an ultra-aggressive adhesive, trade name. Font size shall be easily visible from the finished floor.

5. All labels shall be permanent, i.e. will not fade, peel, or deteriorate due to environment or time.

O. Fire Stop Products

1. All Entrances into IDFs and Telecom Rooms shall have fire stop materal installed

3.0 EXECUTION

3.01 PREPARATION

A. Contractor's on-site RCDD supervisor shall review, approve and stamp all shop drawings, coordination drawings and record drawings.

B. Verify conduit system is properly sized for cables (minimum one inch, unless otherwise noted in Drawings).

C. Verify general conduit route following Drawings.

D. Verify substrates to which work is connected and determine detail requirements for proper support.

E. Verify proper location and type of rough-in for conduit terminations.

3.02 INSTALLATION

A. Coordinate locations with other trades prior to installation.

B. Install work following drawings, manufacturer's instructions and approved submittal data.

C. Installation plans and requests for information (RFIs) shall be reviewed by contractor's on-site RCDD.

D. All work shall be supervised and reviewed by contractor's on-site RCDD.

E. Conduit Design ConsiderationsConduit fill shall comply with ANSI/TIA/EIA-569-A.

1. The minimum bend radius is six times the conduit inside diameter (ID) for a two-inch conduit or less.

2. The minimum bend radius is 10 times the conduit ID for a conduit greater than two inches.

3. All conduit penetrations shall comply with all applicable fire codes. All conduit penetrations in fire-rated walls or floors shall be sealed and fire proofed to at least the rating of the penetration area.

4. Conduits shall be routed in the most direct route, with the fewest number of bends possible.

5. There shall be no continuous conduit sections longer than 100 feet. For runs that total more than 100 feet, insert junction or pull boxes (or gutters if appropriate) so that no continuous run between pull boxes is greater than 100 feet.

6. There shall be no more than two 90-degree bends (180 degrees total) between conduit pull boxes.

7. Changes in direction shall be accomplished with sweeping bends observing minimum bend radius requirements above. Do not use pull boxes for direction changes unless specifically designated otherwise in the Drawings.

8. Unless otherwise noted in the Drawings, conduits entering pull boxes

shall be aligned with exiting conduits.

F. J-hook Design Considerations

1. Use J-hooks only where noted in Drawings.

2. Locate cable hooks on four to five feet centers to adequately support and distribute the cable's weight. These types of supports may typically hold up to 50 cables with an outside diameter of 0.25 inches or less.

3. Suspended cables shall be installed with at least three inches of clear vertical space above the ceiling tiles and support channels.

4. For large quantities of cables (over 50), provide cable trays or other special supports that are specifically designed to support the required cable weight and volume.

G. Cable tray and cable rack/ runway installation shall be in accordance with equipment manufacturer's instructions and recognized industry practices NEMA VE-2.

H. Contractor shall ensure the cable rack / tray equipment complies with requirements of NEC and applicable portions of NFPA 70B and National Electronic Contractors Association's (NECA's) National Electrical Installation Standards (NEIS).

I. All communications cables shall be installed in a cable tray, cable rack, or conduit, unless otherwise noted in Drawings, and cross perpendicular to fluorescent lighting and electrical power cables or conduits.

J. Communications cable shall not be installed in elevator shafts.

K. Ceiling support wire or rod shall not be the means of supporting cables.

L. Communications cable shall not be laid directly on ceiling tiles.

M. Communications cable shall not be supported from conduits or wireways containing power circuits.

N. A minimum of 12 inches access headroom shall be provided above a cable tray. Ensure that other building components do not restrict access to the cable trays from the sides.

O. Power outlets shall not be installed in or mounted directly to cable tray or cable runway unless otherwise specifically noted in the drawings.

3.03 MINIMUM SEPARATION REQUIREMENTS.

A. Unshielded power lines or electrical equipment in proximity to grounded metal

communications conduit pathway:

1. Less than 2 kVA – 2.5 inches

2. 2 to 5 kVA – 6 inches

3. Greater than 5 kVA – 12 inches

B. Power lines enclosed in a grounded metal conduit (or equivalent shielding) in proximity to a grounded metal communications conduit pathway:

1. 2 to 5 kVA – 3 inches

2. Greater than 5 kVA – 6 inches

C. Unshielded power lines or electrical equipment in proximity to open or non-metal communications pathways:

1. Less than 2 kVA – 5 inches

2. 2 to 5 kVA – 12 inches

3. Greater than 5 kVA – 24 inches

D. Cable Tray / Cable Rack Clearances

1. Motors or transformers: 4 feet

2. Fluorescent lighting: 5 inches

3. Above the ceiling tiles: 3 inches

4. Access above the cable tray/Rack: 1 foot

3.04 IDENTIFICATION

A. All conduits, innerduct, junction boxes, gutters and pull boxes shall be labeled.

B. Conduits shall be labeled with the word “communications” and the conduit’s origination room number and destination room number. Permanent room numbers shall be used.

C. Label conduit every 50 feet, at each wall and floor penetration and at each conduit termination, such as outlet boxes, pull boxes, and junction boxes, or as otherwise specified in other Sections.

D. Junction boxes, gutters and pull boxes shall be labeled with identification name or number as determined by Contractor and submitted for approval.

E. Labels on conduits, junction boxes, gutters and pull boxes shall be machine-generated and easily visible from the finished floor.

3.05 FIRE STOP PRODUCTS

A. Fire stop proudcts shall be Fire Barrier Pillows, Pads, Sealant or Putty Stix as approriate for the penetration.

B. Cable Tray Entrances shall utalize Fire Barrier Pillows of various sizes as requred to seal the opening. The number of pillows shall be based on the opening size and installated in accordance with the manufacture's recommendaitons.

3.06 CLEANING

A. Remove all unnecessary tools and equipment, unused materials, packing materials, and debris from each area where Work has been completed unless designated for storage.

END OF SECTION

SECTION 27 24 01

VIDEO WALL SYSTEM INFRASTRUCTURE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings, General Provisions, Special Provisions, Supplementary provisions and Division 1, 26, 27 and 28 Specifications Sections apply to this Section. Work related to this section is described in the following Specifications:

1. 27 05 14 – HORIZONTAL AND BACKBONE CABLING
2. 27 05 37 – SPECIAL SYSTEMS CONDUIT AND CABLE TRAY

1.2 SUMMARY

A. This section, along with the project drawings, specifies the minimum requirements ATL West Crossover “Welcome Display Video Wall System”. This work scope requires the contractor to furnish, configure, provide content, test and demonstrate full functionality at the contractor’s facility; then install, acceptance test and provide training for a fully operational video wall LED Tile based display system to welcome visitors to the Hartsfield Jackson Atlanta International Airport. The LED Video display system shall be installed above the exit from the secure area at the Airport’s west crossover as depicted on the project drawings. The display shall consist of a primary center display which will feature video based content to be designed in conjunction with the airport. On the left and right of the primary display will be two secondary displays which will display directional information to guide passengers to baggage claim as they exit the airport. Content for the displays will be controlled using the airports existing Four Winds Interactive Enterprise content management system. Playback equipment shall allow for the three display areas to be operated as one display if desired with video spanning all three display areas. Typical operation of the displays will allow for video on the primary display and directional information on the secondary displays with the primary video being controlled by the airports marketing department and directional information controlled by the airports signage department.

B. **Basis of Design**: Bidders are advised that Barco Live Dots, model V4 LED Tiles, associated LED video processors, matching Media Converters, Four Winds Interactive, software and Media Player Model W81U-W600-ACT4 have been called out thought this specification and on the attached drawings, as they represent the basis of design for this project’s LED Tile based video wall. The referenced hardware and software shall not be construed as being a sole source requirement, but rather the intent of the system’s configuration and implementation. Please see paragraph 1.6; SUBMITTALS, “A” Bid Compliance Requirement: below. The Bidder shall provide documented and demonstrable technical equivalence for all system hardware and software components as part of his bid

C. This scope includes all labor and materials for furnishing, installing, testing, and training for Barco Live Dots LED Video Display Tiles, all associated mounting, alignment brackets and required accessories, two (2) Barco Video Processors, one (1) Four Winds Interactive / Wiisper 8 Player, Barco Media Converter Transceivers, a Bosch IP PTZ CCTV Camera, and all associated copper and fiber cables and fiber patch panels unless otherwise noted on the project drawings.

D. An initial system configuration, proof of operation and system functional test shall take place at the contractor’s facility. Upon acceptance, the contractor shall install and perform a full system acceptance test of the integrated and assembled video wall system and associated provisions.

This shall occur at locations shown on the Drawings and in accordance with the established project construction schedule(s) and appropriate project phasing. No changes or modifications to any existing Airport Systems, Security or CCTV Equipment, or Operation shall take place without specific authorization from a designated DoA, Security or DIT Representative.

E. Contractor is advised that the specified LED Video Wall Display System shall be installed above the EXIT from the secure area of the Airport, at the West Crossover. The work scope associated with this project will require that the contractor's personnel performing work physically at the Airport will need to obtain an Airport SIDA Access Badge. For additional information please go to: http://www.atlanta-airport.com/business/security/security_services.aspx#Badge .

1.3 REFERENCES

A. The publications listed below form a part of this specification. The publications are referred to in the text by basic designation only. Specific reference in specifications to codes, rules, regulations, standards, manufacturer's instructions, or requirements of regulatory agencies shall mean the latest printed edition of each in effect at the date of contract unless the document is shown dated.

B. Should conflicts arise between referenced requirements, the comply shall comply with the one establishing the more stringent requirements

C. Contractor is advised that as all work under this contract will be accomplished at the Hartsfield-Jackson, Atlanta International Airport, the latest version of the City of Atlanta – Department of Information Technology; Communications Infrastructure Standards shall apply to the work to be accomplished. Where project specification sections and these standards conflict, the more stringent requirement shall apply.

D. Titles of electronic industry standards are frequently abbreviated. The following industry standards apply to this section:

1. UL Underwriters Laboratories
2. NEC National Electric Code
3. ANSI American National Standards Institute
4. EIA Electrical Institute of America
5. TIA Telecommunications Industry Association
6. FCC Federal Communications Commission
7. IEEE Institute of Electrical and Electronics Engineers
8. ISO International Standards Organization.
9. BICSI Building Industry Consulting Services International
10. TDMM Telecommunications Distribution Methods Manual

1.4 DEFINITIONS

A. Names and communications terminology are frequently abbreviated. The following acronyms or abbreviations may be referenced in this section.

1.	CMR	Communications Multipurpose Riser
2.	CMP	Communications Multipurpose Plenum
3.	COA	City of Atlanta
4.	DIT	Department of Information Technology
5.	DOA	Department of Aviation
6.	EIA	Electronic Industries Alliance
7.	EPT	Electrical Plastic Tubing
8.	EMT	Electrical Metallic Tubing
9.	Gbps	Gigabits per second,
10.	HJAIA	Hartsfield Jackson Atlanta International Airport
11.	ID	Inside Diameter
12.	KVA	Kilovolt-Ampere
13.	LED	Light Emitting Diode
14.	MUFIDS	Multi-User Flight Information Display System
15.	OTDR	Optical Time-Domain Reflectometer
16.	OFNP	Optical Fiber Non-conductive Plenum
17.	PVC	Polyvinyl-Chloride
18.	RCDD	Registered Communications Distribution Design (er)
19.	RFIs	Requests For Information
20.	TSR	TSA Regulations 1542, Airport Security
21.	UCDS	Universal Cabling Distribution System
22.	UL	Underwriters Laboratories
23.	UTP	Unshielded Twisted Pair

1.5 DESCRIPTION OF WORK

A. Work included in this section and as detailed in the project drawings includes all labor, materials, and associated incidentals, including conduit and cabling required for the integration, installation, software, software licenses, software configuration, video wall display content and templates, coordination, startup, testing, documentation, and training. This Specification covers the technical requirements for the design, integration, installation, hardware, software and content configuration, system documentation and training, fabrication, contractor and site acceptance testing, on-site system support and warranty maintenance requirements. Functional and operational requirements of the display system shall be coordinated with the Airport's IT, and Marketing Departments, with the understanding that the Video wall display system shall allow for the three displays to be operated as one display if desired with video spanning all three displays, and allow for video on the primary display and directional information on the secondary displays as needed. Contractor shall note that the Video Display System has been configured with a one (1) Tile width gap between the two directional information displays and the primary center display. The system design and implementation shall allow for the future addition of only the compatible tiles, and associated local interconnection cabling to create one large display surface. The System's configuration shall enable the Airport to operate the display from a single Four Winds Interactive Media Player and have the capability of displaying content across the entire display or dividing the display into (3) or more zones or regions using Four Winds Interactive software to operate them separately without needing to change the processors or media player. Certified Barco representatives shall perform the installation of the Barco equipment.

A. Provide one (1) multiple output Four Winds Interactive media player/controller paired with two (2) Barco DV-100 processors to interface with the Barco displays. The FWI controller shall output two (2) HDMI video outputs at up to 1920x1080 each. Each output will feed one of the DV-100 processors. Each of the DV-100 processors in turn will output (2) gigabit Ethernet connections each (for a total of (4)) from the processors to the video display wall utilizing gigabit media converters (these media converters shall be provided by Barco to ensure compatibility and proper interoperability), including all necessary cable, conduit, interface terminations and accessories. Provide all necessary system software and licenses, including but not limited to the FWI dynamic video wall content player and contact manager licenses. Only certified Manufacture's representatives from FWI shall install and implement the FWI software and any database and/or enterprise server modifications.

B. Provide a new Bosch PTZ video surveillance camera, and related mounting hardware and associated cable/conduit to support remote viewing of the entire West Crossover Video Wall Display. This camera shall be interfaced with the Airport's existing video equipment provisions. The existing Bosch Digital Video Recording System shall be utilized to record this new camera. The installation of new CCTV Camera shall include the use of existing Airport network based switches. Contactor shall coordinate with DIT to assign a port so that the identified network switch can be configured to link the new Camera to the Airport's existing networked video equipment. This Contractor shall be responsible for updating the existing databases affected by the extension of the CCTV. A certified Bosch representative shall perform the installation all database modifications.

C. All new materials and equipment shall be supplied to implement this contract. Off-the-shelf products currently manufactured shall be used to the extent practical. The use of non-standard products requires the approval of the Owner.

1.6 SUBMITTALS

A. Bid Compliance Requirement; <u>TO BE PROVIDED WITH THE BID</u>:

It shall be the proposer's responsibility to comply with the specified requirements. The Proposer's response bid as well as any proposed alternative, shall provide complete technical information, including as necessary floor plans/device layouts bock diagrams, power requirements, system server and storage sizing, computing requirements, and catalogue cut sheets for the products, devices, system software and system components that form the proposer's system along with a reference to the relevant sections of this specification. For bidder's paragraphs marked as alternative, proposer shall supply a complete description of the alternative with justification of proposed alternative.

B. Provide in accordance with Submittals, Section 01 33 00;

1. Shop drawings:

   a. Floor plans and elevations for the complete Video Wall Display System
   b. Mounting details, for all provided devices and components called out within this specification and associated project drawings, including any related supplied components.
   c. All custom fabrications required to meet the specification.
   d. All Point to point wiring diagrams for all devices provided under this specification section and related project drawings.

2. Installation drawings:

a. Cabinet construction drawing the media converter units and miscellaneous devices
b. Barco LED Tile installation drawings
c. Details of connections to data and power sources, including power supplies, and grounding.

2. Manufacturers' Data for all supplied components
   a. Software licenses and installation media

4. Hardware and Software Manuals:

   a. Operator's manuals
   b. Maintenance manuals

C. **Submit the following Installation and Testing documents:**

1. Installation Documents:

Contractor shall provide a full set of documentation and plans to delineate the procedures for installing and interconnecting the new Video Wall System equipment. Contractor shall describe how each task will be accomplished, any action required by the Engineer, and a realistic schedule for the completion of each task. These plans must be approved by the Engineer before any action is taken. The following related submittals shall be provided by Contractor for review and approval:

a. Installation Plan

Contractor shall submit, following contract award date; a complete installation plan detailing the procedures to be used by the Contractor for site preparation, equipment installation, commissioning equipment and site clean up. This plan should expand on the Implementation Plan and be in more detail. Each task, procedure, and process shall, at a minimum, be described, and include a schedule and person(s) responsible for the work effort(s). The sequence of activities shall include, but not be limited to, the following:

i. Test Procedures for Local (at the contractor's facility), and Final Acceptance Testing (after installation at the Airport) of the entire Video Wall Display System, and associated devices, including all field distribution and communications devices.

ii. Any measurable milestone, as a part of the tasks, procedure, and process in relation to the overall plan, should be included. This plan must be coordinated with and approved by the Engineer prior to the beginning of the installation.

2. **Test and Inspection Documents**:

a. Equipment Inspections and Test Planning

Contractor shall submit an system test plan for the project for Engineer's approval. This plan shall include complete equipment /system testing. The test shall demonstrate the ability of the system and associated support equipment to perform all the functions required. The test plan must address the purpose of each test, how each test will be conducted, how deficiencies will be handled, who should be present for which part of the test, and how Contractor will certify to the Engineer that all functions and capabilities have been tested and demonstrated satisfactorily. **Contractor shall take note that an**

initial system configuration, proof of operation, system functional and hardware validation test shall take place at the contractor's facility. The associated test procedure shall include a description of each test, including any interfaces which may require simulation and a description of how this shall be accomplished, and a description of all required and services. Include all data sheets and data recording procedures. The following Airport guidelines shall apply to both the Contactor's facility and to the Airport work site:

1) The Contractor shall cooperate fully with HJAIA's inspectors and shall grant HJAIA free access to all documents and work areas in which HJAIA deems necessary to perform thorough and meaningful inspections. HJAIA's inspector(s) shall have the right to inspect the equipment, workmanship, labor, testing procedures, and any other item or task performed, furnished or used by the Contractor under the contract, and HJAIA may reject, without cost or liability, any of the forgoing which are defective or unsuitable for the use and purpose intended or which are not in accordance with the intent of this specification. The Contractor, upon demand by HJAIA, shall remedy or replace, at the Contractor's expense, such defective or unsuitable equipment or performance item. The Contractor shall act promptly to obtain HJAIA's approval of corrective or remedial action(s) and shall implement these actions promptly after receipt of HJAIA's approval.

2) The Contractor shall give HJAIA's inspector(s) at least five (5) working days notice of events or conditions specifically requested by the inspector(s). Where specific inspections are required, the work involved shall not proceed beyond that point until the inspector(s) has made or waived such inspection(s). The Contractor shall provide the inspector(s) with the appropriate technical documentation for use during the inspection(s), as required.

b. Verification and Acceptance Test Plan and Procedure:

After a successful test at the contractor's facility, the contractor shall install and perform a full integrated system acceptance test of the integrated and assembled video wall system and associated provisions. Contractor shall submit this equipment Verification and Acceptance Test Plan for review by Engineer and DoA. After review of the Test Plan, Contractor shall submit for review a complete integrated Video Wall System Acceptance Test Procedure. This procedure shall include a description of each test, including all interfaces. The procedure shall provide a description of all required test equipment and services. Include all data sheets and data recording procedures.

1) Where possible, malfunctioning components shall be corrected at the Airport; otherwise, the contractor shall remove and replace the component. Upon correction/replacement, the component shall be re-tested.

c. Turn-Over Package

Contractor shall submit a separate documentation turnover package to the Engineer for review prior to start of equipment commissioning. The documentation turnover package shall be a detailed description of the equipment and shall record the current status of all equipment. This shall include copies of all system related software, user manuals and software licenses. All submittal requirements listed shall be included if these have not been previously submitted. Revisions to previous submittals shall also be included, bringing the status of these to the completed configurations. In addition to the above, include all records, completed change notices or change orders, warranties, and job control instructions.

3. Content:

The Contractor shall utilize the Software Vendor (Four Winds Interactive) and shall include in the project cost, professional services for the Video Wall content. Working with airport, provide initial content development for (5) 10 second animations to be ready at installation time for the primary display.

a. The Software Vendor's work scope shall also include coordination with Airport to configure and provide templates for left and right Airline Information / directional panels.

b. All Templates and Video Wall content shall be developed to work with the airports existing FWI Enterprise system to allow for easy updating of airlines and directional information using FWI content management, and FWI designer templates.

4. Training Plan and Manuals:

Contractor shall submit the following proposed operator training program information and materials.

a. All Contractor furnished operator training shall be conducted by a certified manufacturer's technical representative.

b. Training plan showing the sequence of, and inter-relationships among all program activities. Separate training classes shall be provided for operators and maintenance personnel.

c. Contractor shall utilize that Software Vendor, FWI, to provide 4 hours onsite content management and best practices training for airport marketing staff and another 4 hours for airport signage staff.

d. Contractor shall provide necessary training for airport IT staff on typical maintenance and troubleshooting of the Video Wall Display System, for day to day operations. The number of hours required to conduct the training program shall be based on certification on the Barco Tiles, the DV-100's and the FWI hardware and software.

i. A narrative description of the training course(s).

ii. Student training manual for the course(s) in the form and content proposed for use in both classroom and on-the-job phases of training. In addition, to normal course information, the manual shall contain an agenda; the hours devoted to each topic/subject and defined objectives for each lesson.

iii. List of duties and responsibilities for the system operators.

iv. Training schedule to include the category of personnel so that the DOA can ensure that the proper personnel (by name) are available for Contractor training at the proper time.

5. Quality Assurance Plan:

A Quality Assurance Plan shall be prepared and submitted to the DOA for review and approval. The plan shall identify proposed Quality Assurance procedures applicable to procuring, installing, testing all security system related provisions and interfaces.

6. Operations and Maintenance (O&M) Manuals:

Operations and Maintenance Manual(s) shall be prepared and submitted. The documents are to be used for routine operation, trouble shooting, preventive maintenance, and cleaning. Provide a quantity of separately bound Operations Maintenance and Manufacturer's Equipment Manuals that is in accordance with Section 01300 and/or the DOA. The O&M requirements shall be as follows:

a. An Operations Manual document shall be prepared in sufficient detail and scope to cover complete operations of the equipment.

b. A Maintenance Manual document shall be prepared and reference information contained in the operations manual. The document shall include all maintenance information in sufficient detail and scope covering all aspects of routine corrective and preventive maintenance, trouble shooting, disassembly, part or component replacement, and system and equipment.

c. A Manufacturer's Equipment Document, also referred to as instruction or service manual, and shall be provided for each item of equipment.

7. Project Record Drawings

Contractor shall provide the Engineer with a designated number of sets of Project Record Drawings that are in accordance with Section 01300 and the Engineer's requirements. These drawings shall be reproducible prints which accurately reflect the equipment as installed. The drawings shall be 24 inch by 36 inch.

1.7 INSTALLATION EXPERIENCE

Contractor shall have provided and completed installation services for at least 2 facility sites similar to that which is to be provided at the Hartsfield – Jackson Atlanta International Airport, with the last two years.

1.8 REGULATORY REQUIREMENTS

A. Conform to all applicable Federal, State and Municipal Building Codes and all other Authorities having jurisdiction.

.

1.9 PRE-INSTALLATION CONFERENCE

A. Convene two weeks prior to commencing contracted work.
B. Require attendance of persons directly involved with the contracted work.
C. Review schedule of installation, procedures and conditions, and coordination with related work.
D. Review existing conditions and modifications made as part of the Work of this project.

1.10 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site under provisions of General Conditions.
B. Store and protect products under provisions of General Conditions.

1.11 ENVIRONMENTAL REQUIREMENTS

Comply with all manufacturers' instructions and recommendations concerning environmental factors.

1.12 WARRANTY

A. Warranty Requirements

Contractor shall warrant to the DOA that the equipment will be free and clear of any lien or encumbrance on the final acceptance date. Contractor shall further warrant for a period of one (1) year Onsite Parts & Labor, 5 Year parts warranty extendable to 7 years by option from the final acceptance date will, under normal use and service, be free from defects and faulty workmanship except as set forth below:

Contractor's obligation under this warranty is to repair or replace defective equipment, parts, and associated labor thereto at its expense. Contractor shall warrant that replacement or repaired equipment furnished hereunder and labor shall be in accordance with current industry standards.

1. The foregoing warranty does not extend to the equipment or any part thereof which has been subjected by the DOA to unauthorized modification, movement, misuse, neglect, or accident; faulty installation, maintenance, or repairs performed by the DOA or third party; or used in violation of instructions furnished by Contractor; removal, defacement, or alteration of the date of manufacture or manufacturer's serial number; increased or addition warranty service requirements for the equipment resulting from DOA's connection of devices, which are incompatible with the equipment; or to any other external cause not attributable to defects in material or workmanship on the part of Contractor.

2. The DOA is granted a nontransferable fully paid license to use all software furnished by the Contractor as part of furnishing the security system equipment provisions under terms established by the software manufacturer. The Authority will be provided with a copy of all applicable licenses. Contractor shall warrant that it has the right to grant such licenses.

3. A copy of Contractor's standard warrant agreement must be provided.

B. Maintenance Requirements during the Warranty Period

The following requirements shall apply to the Contractor responsible for performing maintenance services of all items covered under warranty:

1. Manufacturer and support representative must have a physical office in the state of Georgia.

2. Provide an SLA as follows: 4 Hours Remote Support, 24 Hours Onsite w/ Certified technician M-F 8am-6pm, 24/7/365 emergency support contact.

3. Contractor's maintenance personnel shall respond to all system failures within four (4) hours from the time the Airport/DOA/DIT attempts to notify the designated Contractor representative that remedial maintenance for the failures is required. All failures shall be corrected within eight (8) hours of the arrival on site of Contractor's maintenance personnel. For the purpose of this contract, failures are defined as Complete or partial failure of Video Wall Display System.

3. Minor System Failures:

a. All other failures shall be considered minor failures. Contractor's maintenance personnel shall respond on-site to all minor system failures within eight (8) hours from the time the DOA/DIT notifies or attempts to notify the designated Contractor representative that remedial maintenance for minor failures is required. Minor failures shall be corrected within twenty four (24) hours of the arrival on site, of the Contractor's maintenance personnel.

b. The DOA/DIT agrees to call a Contractor-provided telephone number to effect Contractor notification of maintenance problems. The DOA/DIT shall make reasonable repeat attempts to make notification. However, response time requirements shall be measured from the time of the first attempt by the DOA/DIT to notify Contractor.

4. Spare Parts:

Contractor shall maintain an inventory of spare parts applicable to the work being accomplished. Spare parts, materials, consumables, and any other system item needed in

order to meet the specified warranty maintenance requirements and keep the system a continuous operational mode during the warranty period.

1.13 MAINTENANCE SERVICE

A. Furnish service and maintenance, of the Video Wall System equipment and related components for one year on site parts and labor from date of system acceptance,

1. Contractor shall provide a separate, written maintenance agreement covering the cost of maintenance service, for hardware and software, for years two through five to DoA upon DoA acceptance of the project.

2. At six months and twelve months, following system acceptance, the Contractor shall examine the equipment and related components. Clean and adjust equipment as required. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original equipment.

B. Maintain locally, near the Airport, an adequate stock of parts for replacement or emergency purposes. Have personnel available to ensure the fulfillment of this maintenance service, without unreasonable loss of time.

C. Perform maintenance work using competent and qualified personnel, under the supervision [and in the direct employ] of the Contractor. Support representative must be available for day or night service as necessary and be able to provide SIDA security escorting of technician without the need for an airport representative.

D. Maintenance service shall not be assigned or transferred to any Subcontractor without prior approval of DOA.

1.14 EXTRA MATERIALS

Supply extra materials for all work provisions for this project shall equal as a minimum, five percent (5%) of each type of hardware and device supplied for installation under this contract. As a minimum provide 1 spare LED Tile, one Media Converter Transceiver and one Power supply.

1.15 QUALITY ASSURANCE

A**.** Contractor shall establish and maintain a quality assurance (QA) program and specific procedures which provides documented evidence of system compliance and ensures that all security system manufactured components and physical plant installation meet or exceed all contract requirements. All inspections and tests which are conducted under this quality assurance program shall be subject to review.

B**.** Contractor shall fully describe the QA program for both hardware and software. All components and end items which will comprise the Contractor provided security system equipment provisions shall be subject to a 100 percent Quality Control (QC) Program before shipment and/or installation. Components and end items shipped direct from third party manufacturers to the site must also be subject to such a Quality Control Program. A copy of this program may be requested from the Contractor.

1.16 INTELLECTUAL PROPERTY

A. Patents: Should patented articles, methods, materials apparatus, etc., be used in this work, the Contractor shall acquire the right to use patented materials. The Contractor shall hold the Owner and its agents harmless for any delay, action, suit, or cost growing out of the patent rights for any device on this project.

B. Copyrights: Should copyrighted software be used in this work, the Contractor shall acquire the right to use copyrighted software. The Contractor shall hold the Owner and its agents harmless for any delay, action, suit, or cost growing out the copyrights for any software on this project.

C. License to use: All software required for the complete operation of the system as specified herein shall be delivered with either full ownership transferred to the Owner a non-time-limited license to use on each machine it is installed on, including the right to make back-up copies.

PART 2 - PRODUCTS

2.1 LED Display

A. Manufacturer: Barco Live Dots; (Basis of Design)
B. Model: V4
C. Pixel Pitch: 4.5 mm
D. Brightness: 2,000 nits
E. LED Type: 3-in-1 black SMD
F. Usage Rating: 24/7
G. Pixel Density: 4,612/sqft
H. Viewing Angle: H: 120 degrees V: +60/-60 degrees
I. Contrast Ratio: 2,500:1
J. Power Consumption: 611 W/sqm 244 W/sqm typical
K. Weight: 1,847lb (Not incl. support)
L. Processing: 16bit/color
M. Refresh Rate: 1,200 Hz
N. Certification: CE, ETL, CCC, FCC class A, RoHS, China RoHS, WEEE

2.2 Image Processor for V Series LED Displays

A. Manufacturer: Barco Live Dots: (Basis of Design)
B. Model DV-100 Rack Mountable Processor
C. Outputs: 2 (Cat 6 Cat-6 Gigabit based) Barco VVI V-Series proprietary Video Interface to the LED Display Interface

2.3 Player / Controller for LED Video Wall Display System

A. Manufacturer: Four Winds Interactive; Actineon “Wiisper 8-1” Model W81U-W600-ACT4 (Basis of Design)
    1. 120GB SSD
    2. 6 - USB ports,
    3. 6 – HDMI Ports
    4. 1 – RS232 port
    5. 200 W Power Supply

B. FWI Dynamic Video Wall Content Player Software / License (Basis of Design)
C. FWI Content Manager Software / License (Basis of Design)
D. Windows 7 Pro – 64bit software for Wiisper 8-1 (Basis of Design)

2.4 Media Converter /Transceivers

A. Provide Barco V Series DV-100 Compatible Media converters (Basis of Design)
B. System Shall utilize Multi-Mode Fiber Optic Cable with SC Type Connectors
C. Provide 110VAC power supplies for each Transceiver Unit

2.5 CCTV Surveillance Equipment:

A. Indoor PTZ IP Camera

1. Bosch, 7000IP Series Discreet Color Dome System with Zoom Lens sized on CCTV Schedule, (mounting as shown on the project drawings) no substitutions.

A: Performance Requirements

1. Camera shall be configured with 36x optical zoom, high performance 1/4-in. Exview HAD CCD progressive scan imager.

2. 12x digital zoom

3. Camera shall have variable pan and tilt speeds, and autopivot capability for viewing at all zoom levels.

4. Camera shall have sensitivity down to 0.04 lux in day mode, and 0.0052 lux in night mode at 30 IRE.\

5. Camera shall switch automatically from daylight color operation to a higher sensitivity nighttime monochrome mode when light levels fall below an adjustable threshold level.

6. Camera shall have a Wide Dynamic Range of 92 dB to support extreme high-contrast environments.

7. Camera shall support direct network connection using H.264 and M-JPEG compression and bandwidth throttling

8. Camera shall be configured to operate at 24 VAC and PoE

9. Indoor Mounted Cameras shall be supplied with IP54 protection

10. Rugged high-resolution acrylic bubble

PART 3 – EXECUTION

3.1 GENERAL

A. Installation shall include all labor, materials, tools, equipment, services, and testing to provide a complete, integrated, and operable system for Hartsfield – Jackson, Atlanta International Airport.

3.2 INSTALLATION

A. Install all hardware, software, equipment, components and wiring in accordance with manufacturer's specifications and recognized national and local codes to ensure compliance with specifications.

B. Conform to all applicable provisions of NEC Article 250, Grounding and Bonding.

1. Ground wire shall be insulated and green in color.

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. Section includes fire alarm control panels, manual fire alarm stations, automatic smoke and heat detectors, fire alarm signaling appliances, and auxiliary fire alarm equipment and power and signal wire and cable.

B. Related Sections:

1. Section 26 05 19 - Conductors and Cables.
2. Section 26 05 26 - Grounding and Bonding.

1.02 REFERENCES

A. National Fire Protection Association:

1. NFPA 72 - National Fire Alarm Code.
2. NFPA 101 - Life Safety Code.

1.03 SYSTEM DESCRIPTION

A. Fire Alarm System: NFPA 72, automatic fire alarm system with connections to municipal system.

B. Alarm Sequence of Operation: Actuation of initiating device causes the following system operations:

1. Local fire alarm signaling devices sound and display with signal.
2. Non-coded signal transmits to municipal connection.
3. Location of alarm zone indicates on fire alarm control panel and on remote annunciator panel.
4. Signal transmits to building mechanical controls, shutting down fans and operating dampers.
5. Signal transmits to release door hold-open devices.
6. Signal releases magnetic door hold opens.
7. Signal releases electric door locks.

C. Trouble Sequence of Operation: System or circuit trouble causes the following system operations:

1. Visual and audible trouble alarm indicates by zone at fire alarm control panel.
2. Visual and audible trouble alarm indicates at remote annunciator panel.

1.04 SUBMITTALS

A. Shop Drawings: Indicate system wiring diagram showing each device and wiring connection; indicate annunciator layout, and design calculations.

B. Product Data: Submit catalog data showing electrical characteristics and connection requirements.

C. Test Reports: Indicate procedures and results for specified field testing and inspection.

D. Manufacturer's Field Reports: Indicate activities on site, adverse findings, and recommendations.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with State of Georgia's standard.

B. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience and with service facilities within 100 miles of project.

C. Installer: Certified fire alarm installer with service facilities within 100 miles of Project.

D. Design fire alarm under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Georgia.

1.06 MAINTENANCE SERVICE

A. Furnish service and maintenance of fire alarm equipment for one year from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 CEILING SMOKE DETECTOR

A. Product Description: NFPA 72, photoelectric type ceiling smoke detector with the following features:

1. Adjustable sensitivity.
2. Plug-in base.
3. Auxiliary relay contact.
4. Integral thermal element rated 135 degrees F.
5. Visual indication of detector actuation.
6. Comply with UL 268.

B. Mounting: 4 inch outlet box.

C. Furnish two-wire detector with common power supply and signal circuits.

2.02 WIRE AND CABLE

A. Product Description: Power limited fire-protective signaling cable, copper conductor, 300 volts insulation rated 105 degrees C.

B. Cable Located Exposed in Plenums: Power limited fire-protective signaling cable classified for fire and smoke characteristics, copper conductor, 300 volts insulation rated 105 degrees C, suitable for use in air handling ducts, hollow spaces used as ducts, and plenums.

C. Fire alarm circuit conductors have insulation color or code as follows:

1. Power Branch Circuit Conductors: Black, red, white.
2. Initiating Device Circuit: Black, red.
3. Detector Power Supply: Violet, brown.
4. Signal Device Circuit: Blue (positive), white (negative).
5. Municipal Trip Circuit: Orange, orange.
6. Municipal Fire Alarm Loop: Black, white.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify products and systems receiving devices are ready for installation.

3.02 EXISTING WORK

A. Remove exposed abandoned fire alarm wiring. Cut cable flush with walls and floors, and patch surfaces.

B. Disconnect and remove abandoned fire alarm equipment.

C. Maintain access to existing fire alarm equipment and other installations remaining active and requiring access. Modify installation or provide access panel.

D. Extend existing fire alarm installations using materials and methods compatible with existing installations.

E. Clean and repair existing fire alarm equipment to remain or to be reinstalled.

3.03 INSTALLATION

A. Install 14 AWG minimum size conductors for fire alarm detection and signal circuit conductors in conduit.

B. Mount end-of-line device box with last device or separate box adjacent to last device in circuit.

C. Automatic Detector Installation: Conform to NFPA 72.

D. Ground and bond fire alarm equipment and circuits in accordance with Section 26 05 26.

3.04 FIELD QUALITY CONTROL

A. Test in accordance with NFPA 72 and local fire department requirements.

3.05 MANUFACTURER'S FIELD SERVICES

A. Include services of certified technician to supervise installation, adjustments, final connections, and system testing.

END OF SECTION